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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

EYE

Lancaster, W. B.: The Present Status of Eye Exercises for Improvement of Visual Function. *Arch. Ophth.*, Chic., 1944, 32: 167.

There is abundant evidence for the general proposition that exercises, repetition, practice, and learning lead to better performance and to the acquisition of skill. Many ocular conditions exemplify this law. Since seeing is only partly a matter of the image on the retina and the sensation it produces, and in still a larger part a matter of the cerebral processes of synthesis, in which memories play a principal role, it follows that by practice, by repetition, and by exercises one builds up a substratum of memories useful for the interpretation of sensations and facilitates the synthesis, which are the major part of seeing. Also motor functions are perfected by practice and by learning, and reflex pathways are facilitated. Ophthalmologists have neglected this field, leaving it to irregular, half-trained workers, while they have concentrated their attention on the primary source of the sensation, the image on the retina.

The author is convinced that there are valuable possibilities in this field, awaiting intelligent development. He is skeptical, however, regarding structural changes which are wrought by exercises other than hyperplasia and hypertrophy of the muscles and the consequent changes induced in the tendons, and perhaps in the bones.

EMIL C. ROBITSHEK, M.D.

Brown, A. M.: Prostheses for the Eye and Orbit. *Arch. Ophth.*, Chic., 1944, 32: 308.

Two overcorrections are necessary in making a prosthetic eye and lids. The entire orbit should be sculptured slightly higher on the face than it appears on the other side, and the conjunctiva should be

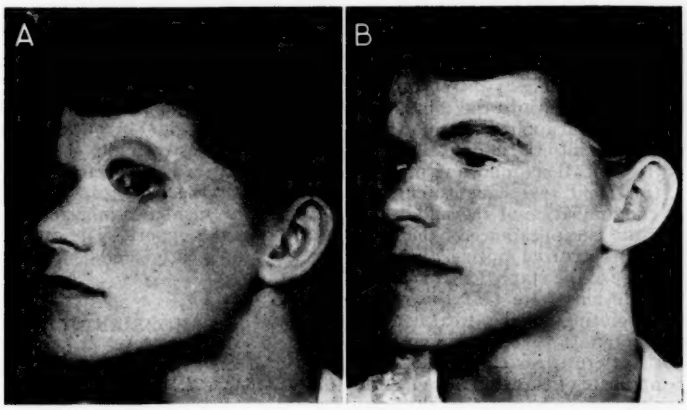


Fig. 1. Face after surgical exenteration of the entire orbital contents for retinoblastoma: A, without, and B, with, a prosthesis. The prosthesis had to be designed as a relatively thin sculptured patch to avoid contact with the exposed sinuses.

slightly more visible in the prosthesis than in the normal eye.

In this article, Brown describes in detail a method which has proved satisfactory in his work, but which can be variously modified to meet individual requirements. EMIL C. ROBITSHEK, M.D.

EAR

Quayle, A. F.: Otitis Externa in New Guinea. *Med. J. Australia*, 1944, 2: 228.

Quayle states that the incidence of otitis externa in Australian troops in New Guinea is discussed.

The most prevalent type, desquamative otitis externa, is described.

It is considered unlikely that the condition is caused by a fungus. Bacteriological examination suggests that it is actually an infection of the skin of the ear canal with pseudomonas pyocyaneus or coliform bacilli. It is seen only rarely in natives.

Treatment is considered, the essentials being the complete removal of desquamated epithelium, and the reduction of swelling by packing.

JAMES C. BRASWELL, M.D.

Collins, E. G., and Hughes, K. E. A.: The Treatment of Chronic Suppurative Otitis Media by the Local Application of Penicillin and Other Drugs. *J. Lar. Otol., Lond.*, 1944, 59: 81.

In contrast to acute suppurative otitis media in which penicillin-sensitive organisms are frequent, the initial cultures in chronic otitis media showed the staphylococcus in only 3 ears, whereas a coliform bacillus was found in 10; the proteus was found in 13 and diphtheroids in 6 of a total of 26 ears. Cultures were mixed in some instances. Cultures were made by means of a platinum loop introduced into the middle ear through the perforation. These organisms are considered to be not only saprophytes, but they are of etiological significance in the persistence of the discharge.

Nine patients were treated by the local application of penicillin. After cleansing by intratympanic syringing, penicillin was forced into the middle ear by a Politzer bag and then applied at eight-hour intervals on a wick leading into the middle ear. Two cases were treated by irrigations following mastoid surgery. Under treatment subsequent cultures showed a frequent contamination of the middle ear by the staphylococcus. Disappearance of the penicillin-sensitive organisms occurred routinely in about five days but recurrence of the staphylococci usually occurred later. Conclusions were that the use of penicillin was disappointing in the treatment of chronic middle-ear suppuration. It has no curative effect on the coliform or proteus bacilli, and in cases of the former type an acute otitis externa frequently occurred. In penicillin-sensitive infections the value of the drug is limited because of the mechanical problem of getting contact with the diseased area. Also, success cannot be expected in extensive mastoid disease or cholesteatoma.

The use of boric acid in 75 per cent alcohol was found to have a good effect in one-half of the patients with a coliform-bacillus infection. Neither the proteus bacillus nor the staphylococcus and streptococcus appeared to be influenced to any extent. Boric iodine powder gave similar results, although it was more effective in the coliform infections. In both cases the drying effect was considered of primary importance. Several preparations of sulfonamides were used locally. Of these the microform sulfathiazole seemed most suited for application. None of these preparations appeared to influence the proteus cases, but some effect was obtained on the coliform cases. The staphylococcus and the proteus bacillus proved in general to be the most intractable to treatment. Other factors such as nasopharyngeal sepsis, the presence of granulomas, and chronicity may have predisposed to failure. The external route of infection of the middle ear in such cases is important, and protection against reinfection while washing should be insured. JOHN R. LINDSAY, M.D.

Atkinson, M.: Ménière's Syndrome; Results of Treatment with Nicotinic Acid in the Vasoconstrictor Group. *Arch. Otolar.*, Chic., 1944, 40: 101.

Atkinson finds that in cases of idiopathic Ménière's syndrome one of two vascular mechanisms is at work, a primary vasodilator and a primary vasoconstrictor mechanism, either of which can produce the characteristic picture. These two groups can be differentiated by means of an intradermal test with histamine. The treatment appropriate to one group is inappropriate and deleterious in the other and therefore accurate grouping is a prime requisite for effective therapy.

Elsewhere the author has published satisfactory results obtained by desensitization in the primary vasodilator group. This article is concerned with the method and the results of treatment in the primary vasoconstrictor group, that much larger group in which the response to histamine injected intradermally is normal.

It is believed that in cases of Ménière's syndrome belonging to the primary vasoconstrictor group the disturbance is due to anoxemia of the labyrinth caused by vasospasm and that the treatment therefore logically calls for a vasodilator drug. In a series of 110 cases the patients were treated medicinally, exclusively with nicotinic acid, by a method described in this report. The attacks of vertigo were relieved or greatly modified in 84 per cent of the cases. NOAH D. FABRICANT, M.D.

NOSE AND SINUSES

Colbert, R. M.: Osteomyelitis of the Frontal Bone Treated with Penicillin. *Ann. Otol. Rhinol.*, 1944, 53: 522.

The use of penicillin in osteomyelitis of the frontal bone gives promise to preclude the radical surgical procedures ordinarily employed, with their attendant deformities.

Penicillin alone cannot be depended upon unless drainage is established surgically. Therefore, penicillin definitely has its limitations and must be used as a supplementary measure to surgery, or vice versa.

Drainage stops fairly rapidly after primary evacuation of the pus when penicillin therapy is instituted.

Constant or frequent local penicillin application is essential even after cessation of the parenteral injections.

At least two weeks of serial, sterile cultures of a wound should be obtained before it is allowed to close.

The fact that penicillin has overcome the acute infections caused by staphylococci and the sulfonamide-resistant streptococci indicates that penicillin is an exceptionally potent antibacterial agent.

JOHN F. DELPH, M.D.

PHARYNX

Marino, H. Total Pharyngoplasty (Faringoplastia total). *Prensa méd. argent.*, 1944, 31: 1509.

Plastic reconstruction of the pharynx is rarely necessary as it is required only after the extirpation of tumors involving the larynx and pharynx. It may be performed at the time of the operation for tumor or at a later date. Generally the latter time is preferred as the patients usually cannot bear the additional operation after removal of the tumor. However, the surgeon who performs the first operation should take into account the possibility of the later plastic operation so as to leave the orifices in as favorable a condition as possible and preserve the skin necessary for the flaps.

Two forms of the operation are described and the steps illustrated. In the first, incisions are made at equal distances from the midline and running from the chin down to the esophagostomy opening. The skin flaps are dissected free on each side and united and sutured in the midline, and the ends of the tube are sutured into the opening in the floor of the mouth and into the esophagostomy opening. The loose skin is brought over from the sides and sutured over the wound. In the second, the incision on one side is made from 6 to 7 cm. from the midline and on the other, 2 cm. from the midline. The broader side is dissected free, brought over to the incision on the other side and sutured to it to form the tube. A cervicothoracic skin flap is brought down to cover the bleeding surface and skin grafts are used to cover the two narrow remaining bleeding surfaces.

Two cases in which this operation was performed are described and illustrated with photographs of the patients. In the first case the first type of operation was performed for epithelioma on January 20, 1944. The new-formed pharynx functioned well up to July 14, 1944 when two fistulous tracts opened in it and relatively severe hemorrhage took place. The patient's general condition indicated recurrence of the tumor.

The second operation was also performed for epithelioma of the larynx. Six weeks after removal of the tumor pharyngoplasty was performed by the first technique. After some time a pulmonary complication developed and the sutures broke down. The plastic operation was repeated by the second technique and at first the neopharynx functioned well. After a time, however, the patient had difficulty in swallowing and roentgen examination showed a tumor mass, evidently cancerous, at the cardia. Within a week he died of copious hemorrhage from this tumor. AUDREY G. MORGAN, M.D.

NECK

Woodson, B.: What Can We Do for Myasthenia Laryngis? *Ann. Otol. Rhinol.*, 1944, 53: 502.

Myasthenia laryngis is a name applied to a morbid entity characterized by asthenia of the phonatory musculature of the larynx, especially the powerful, overworked thyroarytenoideus muscles.

Constant, excessive use of a very high or a very low pitch is the primary cause for myasthenia laryngis.

Given a complaint of recurrent hoarseness, tired voice, and loss of tone, with a mirror view of the larynx showing an elliptic chink in the vocal cords, we can make a diagnosis of myasthenia laryngis, provided we have eliminated other causes.

Prophylaxis is the essence of the successful treatment, as a cure can be obtained only in the early stages of the disease. The author has had no beneficial effects from the use of prostigmine.

Relaxation of the muscles of phonation by special exercises is of great value for preventing a recurrence, but prolonged absolute silence and rest must always precede any treatment.

The middle register must be used to the exclusion of constant very high or very low pitches in singing or in talking. JOHN F. DELPH, M.D.

Ferguson, G. B.: Hemangioma of the Adult and of the Infant Larynx: A Review of the Literature and a Report of 2 Cases. *Arch. Otolar.*, Chic., 1944, 40: 189.

To date, 123 instances of hemangioma of the larynx have been recorded in the available literature. Two distinct classes have been described: the adult cases (116) and the infantile cases (7). One additional case in each class reported herein makes the total 125 cases.

In several instances the diagnosis of hemangioma of the infantile larynx was not made until postmortem examination. However, dermal hemangiomatosis associated with recurring afebrile laryngeal obstruction may suggest the proper diagnosis of this form of laryngeal hemangioma.

The opinion of the majority holds tracheotomy to be the most suitable method of relieving dyspnea caused by hemangioma of the infantile larynx. Small tumors of the adult type of hemangioma may be removed by forceps. Larger tumors demand a careful selection of approach, which may be made through the mouth, by laryngofissure, or by lateral pharyn-

gotomy. Electrodesiccation, surgical excision, or irradiation may be successful. J. M. MORA, M.D.

Monserrat, J. L.: Epithelioma of the Larynx (Epitelioma de laringe). *Rev. As. méd. argent.*, 1944, 58: 670.

This is a statistical review of the subject of epithelioma of the larynx, illustrated with graphs, tables, and photomicrographs of the histological findings in a number of the cases. The author made a study of 250 cases of tumors of the larynx, 180 of them from biopsy material, 42 from autopsies, 13 from museum pieces, and 15 from operative material. Among the 198 cases in which the sex was given 190 were men (95.95 per cent) and 8 women (4.05 per cent). Among the 197 cases in which the age was given, the youngest patient was twenty-three years of age and the oldest eighty; 36.55 per cent of the patients were between fifty and fifty-nine years of age, 30.46 per cent between forty and forty-nine, and 15.73 per cent between sixty and sixty-nine.

Among 10,850 autopsies in the "Instituto Telémaco Susini there were 2,021 cases of cancer, of which 42 were in the larynx; therefore cancers of the larynx were found in 0.38 per cent of the total number of autopsies and in 2.1 per cent of the total number of cancers. Among 243 cases in which histological examinations were made, 82.3 per cent were prickle-cell epitheliomas, divided into subvarieties depending on the degree of differentiation and atypia: 3.7 per cent were epidermoid, 16.45 per cent had horny pearls, 2.87 per cent were dyskeratosic, 44.03 per cent were moderately differentiated, and 15.22 per cent were only slightly differentiated. Intermediate pavement epitheliomas constituted 5.34 per cent; basal-celled 1.23 per cent; and frankly atypical cases 10.28 per cent.

Topographically they were divided into pure laryngeal tumors, laryngopharyngeal tumors, and laryngoglottic tumors. The first group were divided into supraglottic, glottic, infraglottic, and generalized. Of the total, 69.5 per cent were supraglottic and were divided into epiglottic (42.78 per cent), cord-ventricular (18.14 per cent), and aryepiglottidean fold (8.24 per cent). The glottic tumors made up 26.2 per cent of the total and included those of the vocal cords (18.55 per cent), and those of Morgagni's ventricular cavity. The infraglottic tumors made up 2.3 per cent of the whole, and the generalized forms 2 per cent.

AUDREY G. MORGAN, M.D.

Howes, W. E., and Platau, M.: Carcinoma of the Larynx: A Review of Treatment and End-Results at the Brooklyn Cancer Institute. *Arch. Otolar.*, Chic., 1944, 40: 133.

Only carcinoma arising on the vocal cords (intrinsic) was observed to be amenable to surgical treatment in this series of cases. Radiation therapy was shown to be of value in the treatment of both carcinoma arising on the cords and carcinoma of the extrinsic structures of the larynx. Of 68 men and 3 women with lesions proved to be carcinoma of the larynx, who were admitted to the Brooklyn Cancer Institute from 1934 through 1942, 17 are living. Of the surviving patients, 12 had carcinoma originating in the intrinsic larynx, and 4 in the extrinsic larynx.

NOAH D. FABRICANT, M.D.

SURGERY OF THE NERVOUS SYSTEM

PERIPHERAL NERVES

Elkington, J. St. C.: Prognosis of Peripheral Nerve Injuries. *Proc. R. Soc. M.*, Lond., 1944, 37: 547.

The prognosis with regard to recovery in peripheral-nerve injuries is discussed relative to the individual nerves.

The radial nerve has been found to regenerate more rapidly and completely than any other peripheral nerve. While recovery may not be complete, very useful function of the involved muscles returns in a good percentage of cases.

The ulnar nerve is considered the most disappointing and unsatisfactory from the standpoint of recovery of function following injury and repair. Although a fair degree of function may return in the long flexors supplied by the ulnar nerve, there is often little, or no, recovery in the hand muscles.

The median nerve shows a recovery level between the radial and ulnar nerves. Here again, recovery in the long muscles of the forearm is much better than recovery in the small hand muscles supplied by the median nerve, which, as a rule, is incomplete and functionally unsatisfactory. Fair degrees of recovery in the sensory mechanism of the median nerve results in a good percentage of cases, particularly in injuries nearer the wrist.

The sciatic trunk, in the author's experience, has not shown the degree of recovery one might expect following what appears to be a satisfactory anastomosis. Recovery in the gastrocnemius and soleus and tibialis posterior muscles is fairly good; but muscles of the anterior tibial group are rather disappointing, and recovery in these is not frequently seen. Sensory recovery has resulted in rather crude sensation to pinprick and temperature over the sciatic distribution. The mechanism of the foot is usually seriously affected as a result of the incomplete recovery in muscular function.

The peroneal nerve has recovered poorly from the motor standpoint on the whole, despite a fair recovery of sensation. The tibial nerve shows a return of crude sensibility in the sole; muscular recovery seldom proceeds beyond the proximal muscles of the calf.

The author concludes from these observations that the smaller the muscle and the more delicate its function, the less likely it is to make a satisfactory functional recovery after a period of denervation.

The factors modifying the average prognosis in common peripheral-nerve injuries are:

1. Wounds which are complicated by heavily infected compound fractures and severe destruction of the soft tissues, as well as considerable loss of continuity of the nerve.

2. Date of suture; this factor may be complicated by infection, and it is suggested that the minimum of three months be allowed to elapse between complete healing of the wound and an attempt to suture the nerve.

3. Individual factors. There is some reason to believe that nerve regeneration (as with any other process of healing) may vary in different individuals. The only factor here considered was that of age, and the observations would indicate that the younger the patient, the better the outlook, as far as nerve recovery is concerned.

Recovery of function in the part enervated by the nerve is stressed. The preservation of the most complete possible degree of mobility of every part of the limb affected is important in preserving the maximum of ultimate function. Excess splinting often results in unnecessary joint stiffness and considerable functional loss. Psychotherapy and occupational therapy are also of importance in effecting the maximum degree of rehabilitation.

Rehabilitation for Army service in the British Army has been low in patients who have had peripheral nerve injuries sufficiently severe to require exploration. Apparently over 10 per cent of the enlisted men in this group could be returned to some type of Army service in a lower category.

HOWARD A. BROWN, M.D.

Learmonth, J. R.: Personal Experience of Exploration and Re-Exploration of Injured Nerves. *Proc. R. Soc. M.*, Lond., 1944, 37: 553.

The author has set down certain indications for exploring an injured nerve irrespective of the clinical findings. These may be listed as follows: (1) previous long-continued sepsis in the wound, (2) a nerve lying at the bottom of a healed "trough" wound, (3) a history of an unusually severe bleeding from a muscle mass, (4) enclosed crushing types of injury, (5) a nerve or nerves and the main artery to an extremity having been injured at the same level, (6) two or more nerves of the same limb having been injured, and (7) persistent pain or persistent hyperhidrosis in the cutaneous distribution of the injured nerve.

Decision for or against excision and suture in cases of partial division is often difficult. It is advised that these be let alone when there is a fair degree of motor or sensory function in the median or ulnar nerve groups.

Skin grafting over the areas (either split-graft or full-thickness graft) should precede operative repair of the involved nerve.

Conservative treatment is advised when there has been gross loss of tendon and muscle tissue and it is obvious that useful movements cannot be restored.

Re-exploration of a nerve previously operated upon depends upon the interval which has elapsed since suture, the level of the lesion, and the absence of any evidence of nerve recovery after an adequate time has elapsed. Postganglionic sympathectomy

has been tried in a number of cases in an attempt to decrease the total number of axons competing for the tubes in the distal segment following end-to-end anastomosis. No estimate of results is given at this time. HOWARD A. BROWN, M.D.

Botterell, E. H., Keith, W. S., and Stewart, O. W.: Results of Surgical Treatment of Sciatica Due to Herniation of an Intervertebral Disc in Canadian Soldiers Overseas. *Canad. M. Ass. J.*, 1944, 51: 210.

The authors report the results of a follow-up study on 51 cases of herniated nucleus pulposus in which an attempt was made to ascertain the outcome of operation on the patients. The personnel, however, was entirely that of the Canadian Army, and military cases do not react the same as those in civil life. It is emphasized that careful selection of the cases for operation is extremely important, and that it is quite impossible to operate in every case in which the symptoms appear. In the majority of the cases, conservative treatment was administered for a period of three weeks, and the patients were observed for any improvement under this type of management. In some of the cases, the diagnosis was supported by pantopaque or oxygen myelograms. Operation was never done on patients who appeared to be emotionally unstable, or who had some physical defect. It was found very important to ascertain whether or not the patient was desirous of carrying on in the Army, and in the event that he did not wish to do so, operation was not performed. The operative procedure is said to have been the same as that carried out by neurological surgeons.

Postoperative care consisted in keeping the patient in bed for two or three weeks; and reconditioning was commenced during the last few days in bed in the form of tension exercises. A few days later restrictive physical exercises were started and the range of movement was increased gradually until the patient was able to carry on in the "back class." The entire procedure was carried out under the supervision of the surgeons.

The article is accompanied by tables which show the breakdown of the patients who were investigated.

There were approximately 100 men in the original group. All of the 51 patients who form the basis of this study had an operative diagnosis of herniation of a lumbar intervertebral disc. Twenty-nine men were returned to full duty, 14 were returned to sedentary duty, and 8 were unfit for military duty.

ADRIEN VERBRUGGHEN, M.D.

De Rezende, N.: Nerve Grafts from Cadavers in Human Surgery (Enxerto de nervos de cadáveres em cirugia humana). *Rev. brasil. cir.*, 1944, 13: 27.

The author discusses the use of nerve grafts from cadavers in the repair of nerve injuries. Nerve grafts have been used chiefly in military surgery. The graft must be taken from the cadaver not more than twenty-four hours after death. The technique of taking the graft and of fitting it into the nerve to be treated is described. The author uses a 50 per cent solution of gum acacia to cement the graft into the lacerated nerve. After the operation the patient is given subcutaneous or intramuscular injections of cholinergic drugs such as vitamin B and strychnine. These cholinergic drugs have the property of stimulating the healing of wounds of nerve tissue. Three clinical cases are described in which the results were excellent. The histories of these and 21 other cases which the author treated will be read at the next medical Congress in the United States.

In the after-treatment, electrotherapy, hydrotherapy, physical therapy, immobilization, and light massage are useful. References are given to American journals in which these experiments are published.

AUDREY G. MORGAN, M.D.

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Grimson, K. S., Kernodle, C. E., Jr., and Hill, H. C.: Hypertension. *J. Am. M. Ass.*, 1944, 126: 218.

It is well realized that sympathetic surgery for hypertension requires a careful evaluation of each case. The patients who apparently receive the greatest amelioration are those in whom the condition is due to a vasomotor instability, and to which the term "neurogenic hypertension" has been applied. Since the cases due to renal factors have not been relieved, the authors believed it important to evaluate their diagnostic criteria of the effect of rest, sedation, and anesthesia. To this end, a series of tests have been performed on experimental neurogenic hypertension in dogs.

The effect of activity, rest, and natural sleep on blood pressure was examined in a group of 4 normal and 4 neurogenic hypertensive dogs. As would be expected, a drop in blood pressure occurred during rest and sleep in the normal dogs, and also in 3 of the hypertensive dogs, but in the latter 3 cases it never reached the low levels occurring in the normal dog.

Sodium amytal, averaging 0.2 gm. per dog, had no specific effect on the blood pressure of either normal or hypertensive dogs.

Sodium pentothal anesthesia was induced in 5 normal dogs, and in 6 neurogenic-hypertensive and 7 renal-hypertensive dogs. This was administered intravenously in a 2.5 per cent solution until pain reflexes were abolished. The results in the normal and renal-hypertensive dogs were variable; a rise in blood pressure occurred in about half of the dogs, and a fall occurred in the rest. However, 5 of the 6 neurogenic-hypertensive dogs revealed a decided drop in blood pressure.

Chloralose anesthesia had no definite effect in either the controls or the neurogenic-hypertensive dogs. Ether anesthesia had little effect on the blood pressure of the normal dogs, but in the neurogenic-hypertensive dogs a definite drop in blood pressure occurred in all.

The conclusion is reached that sodium-pentothal or ether anesthesia produced a drop in the blood

pressure of neurogenic-hypertensive dogs to approximately the same levels as did rest and natural sleep. Sodium-amytal or chloralose had no specific effect.

The records of 20 patients treated by paravertebral sympathectomy, and tested preoperatively for the effect of sodium amytal and rest on their hypertension, were reviewed. Although these tests may aid in the evaluation of the hypertensive patient, their importance should not be overemphasized for the results may often be variable and misleading.

JACK I. WOOLF, M.D.

Everts, W. H., and Woodhall, B.: The Management of Head and Spinal-Cord Injuries in the Army. *J. Am. M. Ass.*, 1944, 126: 145.

Head injuries make up 6 per cent of battle casualties. Of these more than three-quarters are closed head injuries with or without simple skull fracture, and the remainder are open head injuries.

Closed head injuries receive conservative therapy. During the acute phase, in the first seventy-two hours, the patient is placed on a modest fluid intake (1,500 to 2,000 cc.) and a light diet. Unless indicated, a lumbar puncture is not done until after from forty-eight to seventy-two hours, when it may be desirous to know the pressure and whether or not the fluid is blood-stained. Sedatives are used with caution as they may produce stupor or mask bleeding. Hypertonic solutions are used only when edema is evident and producing symptoms a day or two after the injury. Normal serum albumin is probably the best hypertonic solution. Unless indicated, roentgenograms of the skull are not taken until after the first day or two. In some of the forward stations, closed head injuries have been evacuated in ambulatory fashion as soon as the patient was clearly conscious. In general the patient is kept in bed for two or three weeks or more, according to the severity of the injury as estimated from the duration of the period of unconsciousness; the degree of disturbance of the temperature, respiration, and pulse; pupillary abnormalities; and focal neurological signs. In a number of the milder head injuries latrine privileges were permitted after the first twenty-four to seventy-two hours and then there was a graduated program of activity over a period of the next ten days with return to light duty in about two weeks and full duty in six. The results in this group were gratifying and the incidence of post-traumatic syndromes was especially low.

All patients with head injuries receive a most painstaking neurological survey in the general hospitals, including electro- and pneumoencephalography, mental tests, and psychiatric studies. Of a group of 131 patients with closed head injuries 79 per cent returned to full duty after an average hospitalization of twenty-five days, 15 per cent developed post-traumatic syndromes, and 6 per cent were still being rehabilitated.

Open head injuries comprise about one-fifth of all head injuries. In two series the mortality was respectively 23.6 per cent and 15 per cent for penetrating wounds, and 1 death in 208 and 2 deaths in 224 nonpenetrating wounds. The most important complication is infection, particularly in those cases in which early and complete débridement of the cranial wounds has not been accomplished. In two series fatal infection after operation supervened in 3.7 per cent and 10.8 per cent, respectively. Chemotherapy with sulfonamides in fresh wounds does not reduce the incidence of infection when débridement is delayed.

Two new substances, penicillin for the control of infections, and fibrin foam for the control of hemorrhage, are now receiving clinical trial. In brain abscess, surgical drainage must be continued during the period of penicillin therapy as penicillin alone is inadequate. Skull defects in otherwise recovered individuals may be repaired with tantalum plates 0.015 inch in thickness, by inlay, or other techniques. Before the skull defect is repaired, evaluation of the existing cerebral scar is attempted. Post-traumatic epilepsy has been of minor significance in these cases. Records of cortical electrical activity taken through the tantalum plates are unchanged when compared with preoperative records.

Spinal-cord injuries constitute less than 1 per cent of all battle casualties. Three-fourths were caused by foreign bodies and the other fourth by fracture. Incomplete lesions of the cord were more common than complete lesions (this statement referring to functional and not to anatomic lesions). Sensory examination was the most accurate guide as to the level, and bladder signs were the best guide as to the severity of the lesion; the latter also were good indications for the urgency of operation. Operation was performed in 31 cases; 12 lesions were complete and 19 incomplete. There was improvement in all incomplete lesions operated on and no improvement in any of the complete lesions. Of those in which operation was not performed, 1 incomplete lesion but none of the complete showed improvement. The reasons for operation on complete lesions were cerebrospinal-fluid leaks, the presence of block, and x-ray evidence of cord compression. There were 4 deaths, all in cases of complete lesions. Death was due to pneumonia and lung abscess in 1 case and to pulmonary emboli in 2 cases; the cause of death in the fourth patient was not ascertained as there was no autopsy. Travel is damaging to cord injuries.

The use of the Stryker turning frame has prevented the occurrence of fresh decubitus ulcers and facilitated the nursing care of the patient. Suspension of the feet, freeing them from contact with the bed clothes, and frequent and effortless turning of the patient promote healing of the pressure areas. Change of the bed linen offers no problem on such a frame.

DAVID J. IMPASTATO, M.D.

Grollman, A., and Rousseau, J. P.: Metabolic Craniopathy: Hyperostosis Frontalis Interna. *J. Am. M. Ass.*, 1944, 126: 213.

The authors report a study of 40 patients with the diagnosis of metabolic craniopathy or hyperostosis

frontalis interna. The diagnosis was based upon the history, physical examination, and laboratory studies, and was confirmed by roentgenological findings. These patients were seen at the North Carolina Baptist Hospital, Winston-Salem, during the past two and one-half years, and comprised part of a group of 78 patients who, on roentgenological examination of the skull, were found to have the calvarial hyperostosis suggestive of this disorder.

The highest incidence as to age distribution occurred in the fourth and fifth decades. The actual age of onset is unknown; however, it must have been much earlier, in view of the rather benign and insidious character of the condition. There was but 1 male among the patients.

The symptomatology may be grouped into any one or more of the following categories: metabolic, endocrine, hypertensive, or neuropsychiatric. The latter group contained the largest number of patients, but the complaints were extremely variable and did not conform to any definite syndrome. These ranged from minor neurotic complaints to hysteria and major psychosis.

Twenty-three of the patients had metabolic disturbances consisting chiefly of obesity. The basal metabolic rate and blood-cholesteral levels were essentially normal. Hyperglycemia was found in only 3 cases, and in 2 of these it was of a very mild degree. The principal endocrine disturbances were related to abnormalities of menstruation not associated with recognizable pelvic disturbances. Hirsutism was prominent in 12 patients. The 17-ketosteroid excretion was normal in all patients examined in this regard. Hypertension was present in 16 patients, and, although identical with benign hypertensive cardiovascular disease, was thought to be another manifestation of the metabolic craniopathy.

The typical roentgenological picture of the skull was a hyperostosis of the inner table of the frontal bone. The outer table, and thus the external configuration, remained unaltered. Although this was true in all of the cases in this report, other areas of hyperostosis may occasionally be seen in the base of the skull, and in the parietal areas, or there may even be diffuse calvarial changes. The frontal bone may attain a thickness of as much as 5 cm. on x-ray measurement. Although no specific worth-while treatment is known, several of the patients responded favorably to irradiation of the pituitary-hypothalamic area. Others so treated had no amelioration of their symptoms.

Despite the absence of a known pathological basis, it is the authors' opinion that metabolic craniopathy is a specific clinical entity of relatively frequent occurrence. JACK I. WOOLF, M.D.

Dowling, E., Viale, S. M., and Legarreta, C. C.: Peritorcular Meningiomas (Meningiomas peritorculares). *Rev. méd. quir. pat. fem.*, B. Air., 1944, 12: 339.

The author discusses a group of meningiomas originating near the torcular Herophili and compressing the occipital lobe. Two cases are described. The first was in a woman forty-six years of age who for three months had complained of dizziness with a tendency to fall forward. At the same time she began to have difficulty in finding words to express her thoughts. Soon afterward she noticed failing vision and frontal headache followed by nausea and vomiting. Examination of the eyes showed right lower homonymous quadrantanopsia with intense edema of the discs and peripapillary hemorrhages. Ventriculography showed displacement of the ventricular system to the right and forward displacement of the posterior part of the left lateral ventricle, the capacity of which was reduced. Operation showed a tumor of the region of the torcular Herophili, which was removed. The patient was well for four months when she returned with a recurrence of symptoms and a second operation showed a tumor in the same region twice as large as the original one. Some months later she returned with another recurrence of the symptoms and inspection showed tumor infiltration of the scalp. She died two months later. The tumor was of the angioblastic type.

The second patient was a man of fifty who had intense pain in the right temporo-occipital and maxillary regions, dizziness, headache, and vomiting. He had once fallen in a canal because he thought there was a bridge across it where none existed. He presented right homonymous hemianopsia which did not spare the macular bundle. This, the left hemiparesis, and the electroencephalographic examination indicated that the tumor was not confined to the occipital region but extended into the temporal region as well. A large vascular tumor originating in the peritorcular region was removed. The patient recovered and is well fourteen months later.

The difficulties of diagnosing the occipital localization of these tumors is emphasized. The two leading symptoms of occipital localization are homonymous hemianopsia and visual hallucinations. In temporal tumors the visual field defect is supposed to begin in the upper quadrants, while in those of the occipital region it begins in the lower quadrants; but often the patients do not come for examination until the homonymous hemianopsia is completely established. The visual hallucinations in occipital tumors are supposed to be merely dots and stripes of bright light, while there are more elaborate hallucinations in temporal tumors. However, in the authors' second case the man believed he saw a bridge over a canal and as a result walked into the canal. The coexistence of cerebellar symptoms indicates an occipital tumor. It is possible that the preservation of the macular bundle and consequently of central vision so frequently seen in occipital lesions masks the failing vision to a certain extent and explains the great edema of the disc and even secondary atrophy which are observed when the patients first come for examination. It is certain that the diagnosis of tumors of the occiput is not on as firm a foundation as that of tumors in other parts of the brain, and generally only a presumptive diagnosis of peritorcular

tumor can be made. About half these tumors are angioblastic and, therefore, particularly malignant.

AUDREY G. MORGAN, M.D.

Hortega, P. del R.: Study of the Oligodendrogliomas (Contribucion al conocimiento de los oligodendrogliomas). *Rev. As. méd. argent.*, 1944, 58: 511.

This is a detailed discussion of the cell structure of the oligodendrogliomas, illustrated by photomicrographs of these tumors in the brain, olfactory bulb, and optic chiasm. Bailey and Cushing discussed these tumors although they were not sure that they had identified the cells with the oligodendrocytes described by Hortega in 1921.

These tumors occur chiefly in the brain. They are of slow growth, relatively benign and made up of small cells with a round nucleus and a clear cytoplasm. There are four types of normal oligodendrocytes, only two of which, the first and fourth, are found in these tumors. The first is a round cell and the fourth, an elongated or Schwannoid type. Contrary to what occurs in the normal cell, the neoplastic oligodendrocyte may adopt different forms and pass from the round to the stellate shape. Among the oligodendrogliomas which the author observed he rarely found cells of a single type; there were not only small round cells but others with numerous processes. Among the tumors that he describes there were at least two types with cells which might be considered oligodendrocytes. In the first, most of the cells were undifferentiated morphologically, but there were isolated cells or small groups of cells that had the appearance of astrocytes. In the second type most of the cells were differentiated but did not have the appearance of true astrocytes. The latter were cells which developed to a certain extent according to the rules followed by normal cells but never became astroblasts or astrocytes. It is possible that in a single tumor there may be areas that can be classified as astrocytomas, while other parts are distinctly oligodendrogliomas.

It is an interesting fact that the only slightly differentiated oligodendrocytes may make the tumor more malignant as they become detached from the tissue and fall into the spinal fluid. They are carried to distant parts and produce metastases. One of the tumors, an oligodendroglioma of the olfactory bulb, followed this course. AUDREY G. MORGAN, M.D.

SPINAL CORD AND ITS COVERINGS

Shenkin, H. A., and Alpers, B. J.: Clinical and Pathological Features of Gliomas of the Spinal Cord. *Arch. Neur. Psychiat.*, Chic., 1944, 52: 87.

A correlation of the pathological and clinical features of 27 verified cases of intramedullary gliomas of the spinal cord is presented, and an attempt is made to clarify the diagnostic characteristics of these tumors. The cases were evenly distributed as to age, from the second to the sixth decade, and the tumors occurred predominantly in males. The average duration of the symptoms in all cases was twenty months. The duration of the symptoms appeared to increase, the lower the position of the tumor in the spinal cord, and ependymomas were found to have a distinctly longer course than astrocytomas. It appears, therefore, that the duration of symptoms cannot be used as a safe criterion in the differential diagnosis of intra- and extramedullary tumors.

The first symptom was pain in 16 of the 27 cases, weakness in 7, and paresthesia or numbness in 5 cases. The location of the tumor was apparently of no significance so far as the type of onset was concerned, except that with tumors of the cauda equina the onset was always with pain. Severe injury preceded the onset of the symptoms in 6 cases. Because of the conflicting evidence concerning the presence or absence of pain with intramedullary tumor, the occurrence of this symptom cannot be used as a differential point in the diagnosis of intra- and extramedullary growths. Pain occurred in 23 of the 27 cases, and was the outstanding sympton in 18 cases. Root pain was more common than spinal pain, while tract pain was least common.

Paresthesias and other sensory symptoms were noted in 22 cases. In all 27 cases there were motor symptoms or signs of varying degree, in 9 of which they initiated the picture. Objective sensory changes were present in 24 cases. Sensory dissociation was definite in 8 cases. The objective sensory changes with tumors of the caudal region were insignificant and not in proportion to the subjective sensory complaints. With tumors of the other regions the sensory changes appeared to be significant and of great importance for the accurate horizontal localization of the tumor in the spinal cord. With certain reservations, the presence of a waistcoat type of sensory disturbance, or relatively greater alteration of sensation in the more proximal dermatomes, is indicative of an intramedullary process. Less reliable is the dissociation of sensory loss. An indefinite level for sensory loss is of little practical importance in the localization of a spinal tumor within the substance of the cord. The presence of a Brown-Sequard syndrome does not eliminate definitely the possibility of a primary tumor of the spinal cord, and, contrary to the frequently expressed opinion, failure or absence of involvement of the anogenital region does not appear to be characteristic of intramedullary tumors. In 16 cases symptoms of sphincter disturbance were present. Signs referable to the cranial nerves were frequent with tumors which extended as high as the second cervical segment.

In 25 cases manometric studies were made. Complete block was shown in 13, and partial block in 8. In 4 cases with normal cerebrospinal fluid dynamics, the thoracolumbar portion of the cord was involved. The most frequent abnormality of the spinal fluid was an increased total protein, the highest values being associated with tumors having the greatest longitudinal extent. Xanthochromia was recorded in 12 instances, but the cell count was normal in most cases.

A study of the many contributions concerned with the intramedullary gliomas indicates that the clinical pictures of intra- and extramedullary tumors are much the same, and that the several points cited for the differentiation of the two conditions are only relatively significant. Despite this, the distinction is not clinically difficult when all points are considered. The most distinctive feature of an intramedullary growth is a greater disturbance of sensation in the proximal segments than in the more distal segments.

JOHN L. LINDQUIST, M.D.

SYMPATHETIC NERVES

Engel, G. L., Romano, J., and McLin, T. R.: Vasodepressor and Carotid-Sinus Syncope: Clinical Electroencephalographic and Electrocardiographic Observations. *Arch. Int. M.*, 1944, 74: 100.

Syncope, or fainting, is a transient reaction and it is, therefore, quite difficult to obtain satisfactory reports, especially electrocardiographic and electroencephalographic tracings of patients during an attack. In this article, however, the various types of attacks which can be induced were studied by means of electrocardiograms and electroencephalograms. The work was done in the department of psychiatry in the University of Cincinnati College of Medicine. Eighteen patients and volunteer subjects were studied. Electroencephalograms and electrocardiograms, as well as clinical observations, were made of the patients simultaneously, and suitable complete records are appended to the original article, as well as the clinical data on each case.

Syncope was induced by a variety of means, including venipuncture; distention of the duodenum, colon, rectum, or vagina; hyperventilation; and the carotid-sinus reflex. The mechanisms of the various types of syncope is discussed. In some instances the distention of the colon was induced by giving large enemas, by inserting a rubber bag and inflating it, or, in 1 instance, by inserting a duodenal tube and inflating a rubber bag in it. These phenomena are carefully described.

There are two main types of fainting, which were discussed: syncope of the vasodepressor type associated with pain, distention of the viscus, venipuncture, and other manipulations, and syncope induced by manipulation of the carotid sinus. It was found that vasodepressor syncope could be induced by a variety of stimuli. The surroundings and psychic reaction of the patient are especially important in this variety of syncope. Psychological experiences, such as seeing blood, viewing mutilations, hearing bad news, or other emotional reactions, strongly predisposed certain people to vasodepressor syncope. Furthermore, the vasodepressor reaction may continue for a considerable time after withdrawal of the original stimulus. There results a disturbance in the circulatory apparatus in which there is a discrepancy between the volume of the vascular bed and the volume of the circulating blood. In most instances this can be overcome by gravity; hence, the advantage of collapse and falling to the ground. Certainly, the erect posture of the patient was unsatisfactory.

The symptoms and signs of vasodepressor syncope, such as pallor, sweating, weakness, nausea, and faintness are secondary to the fall in arterial blood pressure. This was shown by the prompt improvement in a recumbent position, when the blood pressure rose. Even though the persistence of the fundamental disturbance could be repeatedly demonstrated by returning the subject to the erect posture, in some cases the disturbance continued even with the patient in the recumbent position, and the authors find it difficult to say at what stage this condition of persistent hypotension passes into a condition which could be described as primary shock. Unconsciousness in vasodepressor syncope is a late phenomenon and occurs only when the arterial blood pressure has been extremely low.

Recovery from vasodepressor syncope may take place in the erect position, but the subject should be encouraged to lie down and, especially, to move the legs with a certain amount of activity, and then should be gradually restored to the erect position. However, he should be warned against remaining motionless, standing, or even sitting. The old remedy of slapping the face and throwing cold water on the individual has a sound theoretical foundation as it provokes resistance and muscular activity.

With regard to the electroencephalographic findings in these cases, slow waves invariably appeared in the electroencephalogram in any case of syncope which was allowed to progress to unconsciousness. Furthermore, recovery from complete unconsciousness always took place in a certain definite way: (1) the waves decreased in amplitude, (2) there was random low voltage and fast activity, and (3) low amplitude regular waves occurred which rapidly reached alpha frequency. These stages, occurring over a course of seconds or minutes, are essentially the same as those observed during recovery from delirium over the course of days or weeks. In 2 cases of the cerebral type of carotid-sinus syncope the development of contralateral focal neurological signs and symptoms without loss of consciousness was associated with abnormal waves from the ipsolateral cortex.

Another report, which is being prepared by the authors, will show that hysterical syncope is not accompanied by any slow waves in the electroencephalogram. Hypoventilation was also used to produce syncope, again with the appearance of slow waves in the electroencephalogram.

ADRIEN VERBRUGGHEN, M.D.

Smithwick, R. H.: The Surgical Treatment of Hypertension: The Effect of Radical (Lumbodorsal) Splanchnicectomy on the Hypertensive State of 156 Patients Followed Up For From One to Five Years. *Arch. Surg.*, 1944, 49: 180.

The author has thoroughly reviewed his series of 156 hypertensive patients operated upon during the

past five years. The lumbodorsal splanchnicectomy as originally advocated, and now known as the Smithwick sympathectomy, was used. The extent of the denervation varied, but in all of the cases the great splanchnic nerves were removed from the celiac ganglion to at least the midthoracic level. No correlation has been drawn in this report between the extent of the operative procedure and the results. The operative mortality rate was 2.8 per cent.

A gross tabulation of the results of splanchnicectomy has been made from changes of the diastolic blood pressure. This is shown in Table I.

The period of reduction in blood pressure following operation is still unknown. However, a comparison between two-thirds of the patients followed up for approximately two years, and one-third of the patients followed up for approximately three years has not revealed a significant difference.

By further dividing the patients on the basis of the pulse pressure, three types of hypertension have been derived. Type I is that group having a pulse pressure of less than one-half the diastolic blood pressure; Type II, having a pulse pressure up to 19 mm. more than one-half the diastolic pressure; and Type III, having a pulse pressure 20 mm. or more greater than one-half the diastolic pressure. This grouping has given a very interesting and helpful prognostic criteria in that the patients with the smallest pulse pressure, on a percentage basis, had the best results, while those with the highest pulse pressure had less favorable results.

The sex factor is of interest since 84.8 per cent of the women and only 71.8 per cent of the men were definitely benefited.

A point worthy of further study is the correlation of renal pathology with results of the operation. Renal biopsy material of 100 patients was classified and grouped into that of patients with none to mild changes and that of patients with advanced degrees of arteriolar disease; however, there was essentially no difference in response to surgery. An unusual finding was that of 11 patients with pyelonephritis; 90.1 per cent had excellent results, while 100 per cent had some benefit. Glomerular filtration was reduced about 20 per cent immediately after operation; however, it returned to normal within one year. Studies of kidney function revealed that the majority of patients had some improvement after operation as adjudged by clearance of sediment, disappearance of albumin, and improvement in concentration.

Hypertensive funduscopic changes were correlated with the splanchnicectomy, and it was found that in the more advanced cases improvement of the fundus picture was more likely to occur. Among the most severely damaged cases, improvement occurred in 100 per cent. It should be noted that of the group of patients who did not obtain a satisfactory drop in blood pressure, 48.2 per cent revealed an improvement in their eyegrounds.

An electrocardiographic study before and after operation revealed an improvement in 63.5 per cent of the records of two-thirds of the patients who had definitely abnormal records. Again it is worthy of note that of the patients not obtaining satisfactory blood-pressure responses, 55.9 per cent showed an electrocardiographic improvement.

It therefore appears that the present available methods of study do not give full value to the beneficial results derived from splanchnicectomy as measured by a change in blood pressure.

JACK I. WOOLF, M.D.

TABLE I.—EFFECTS OF LUMBODORSAL SPLANCHNICECTOMY ON THE BLOOD PRESSURE OF ONE HUNDRED AND FIFTY-SIX PATIENTS FOLLOWED FROM ONE TO FIVE YEARS*

Result, group†	No. of patients	Percentage			Effects of lumbodorsal splanchnicectomy	
					Effect on diastolic blood pressure	Average reduction
1	64	41.0	61.5	79.4	Lowered 30 mm. or more	61/43
2	32	20.5			Lowered 20 to 29 mm.	44/24
3	28	17.9			Lowered 10 to 19 mm.	27/15
4	17	10.9	20.6		Lowered 0 to 9 mm.	10/ 5
5	15	9.7			Increased	(increase) 18/11
Total	156					

*Average time followed, twenty-two and a half months.
†In this table the results are considered as a whole. They have been subdivided into six smaller groups according to type of blood pressure and sex (tables 2, 3 and 4). When subdivided in this fashion, the results are much more helpful in indicating the outlook for the individual patient than when they are undivided, as in this table.

Rojas, F., Smithwick, R. H., and White, P. D.: Nonspecific Major Operations and Lumbodorsal Sympathectomy. *J. Am. M. Ass.*, 1944, 126: 15.

In 1939 Volini and Flaxman followed the course of the blood pressure of 17 hypertensive patients operated on for different reasons not related to their hypertension. They observed in almost every case a postoperative reduction in the blood pressure, and concluded that the blood-pressure reduction attributed to nerve resection was actually due to the conditions brought about by the major operations. On this basis they denied the specific effect of sympathetic-nerve resection on hypertension. In 1943 Adamson and Dubo arrived at similar conclusions.

With the purpose of checking these opinions the authors studied the records of 100 hypertensive patients who had been submitted to various major operations (Group 1), and of another 100 hypertensive patients who had submitted to bilateral lumbodorsal sympathectomy by the procedure of Smithwick (Group 2).

This study shows that nonspecific major operations produce some immediate reduction of the blood pressure of hypertensive individuals (Table I). How-

TABLE I.—IMMEDIATE EFFECT OF OPERATION

	No results	Moderate reduction	Pronounced reduction
Group 1. Immediate reduction (up to 6 months after the operation)			
Systolic pressure.....	49%	49%	2%
Diastolic pressure.....	60.3%	27.1%	12.6%
Group 2. Immediate reduction (10 days after the second stage of the operation)			
Systolic pressure.....	3.3%	24.4%	72.3%
Diastolic pressure.....	8.8%	37.7%	53.5%

TABLE II.—CONDITION SIX OR MORE MONTHS LATER

	No results	Moderate reduction	Pronounced reduction
Group 1. Late reduction (more than 6 months after the operation; average period of observation, 10 months)			
Systolic pressure.....	82.7%	17.3%	0%
Diastolic pressure.....	86%	14%	0%
Group 2. Late reduction (more than 12 months after the second stage of the operation; average period of observation, 20 months)			
Systolic pressure.....	9.6%	28.1%	62.3%
Diastolic pressure.....	7.6%	36.1%	56.3%

ever, this reduction is not pronounced and in most cases persists for only a short time (Table II). In the majority of cases lumbodorsal sympathectomy produces pronounced reduction of the blood pressure, which is still present after a considerable period of time (Tables I and II). DAVID J. IMPASTATO, M.D.

MISCELLANEOUS

Gurdjian, E. S., Webster, J. E., and Stone, W. E.: The Cerebral Metabolism in Experimental Head Injury. *War Med.*, Chic., 1944, 6: 173.

An experimental study was conducted to ascertain the effects of head injury on the cerebral oxidative metabolism. Experimental injuries were made on dogs, following which blood specimens were obtained from the femoral artery and the femoral and external jugular veins and were compared with specimens taken previous to the blow. The longitudinal sinus was also exposed, and specimens were taken from this region, following which the brain was further exposed and frozen *in situ* with liquid air. Oxygen levels, and carbon-dioxide and oxygen capacity of the blood were determined, as well as the blood level of dextrose and the lactic-acid level in the brain.

The most common observation in this series of experiments was that of increased oxygenizaton after injury to the head. No significant changes were noted in the cerebral arteriovenous differences in oxygen. The carbon-dioxide values were about the same as in the control animals. The areas of the cortex showed no macroscopic evidence of contusion, and often appeared entirely normal as regards the chemical constituent studies, even in profoundly injured animals. Areas of cortex which had sustained visible contusion showed marked chemical changes roughly proportional to the degree of local damage, but they did not bear relation to the physiological response. The chemical changes consisted of increase in lactic acid, loss of phosphocreatine and adenosine triphosphate, and some increase in inorganic phosphorus.

A study of the effect of oxygen inhalation on brain contusion was conducted. The result would indicate that the administration of oxygen induces no pronounced acceleration of recovery processes, but does seem to produce a trend toward better recovery.

Observations in this study would indicate that the chemical changes in the areas of brain contusion are comparable to the changes observed in cerebral anoxia and in cerebral tissue after death.

Delayed experiments and studies were made after the lapse of several days following injury, and improvements were found to have occurred in the oxidative processes in areas of contusion, as evidenced by return toward normal levels of the chemical constituents that were studied.

HOWARD A. BROWN, M.D.

Gurdjian, E. S., and Webster, J. E.: Acute Physiological Responses in Experimental Head Injury, with Special Reference to the Mechanism of Death Soon after Trauma. *Surgery*, 1944, 16: 381.

In this report the changes in blood pressure, the pulse and respiration, the conscious state, and the reflexes immediately following trauma to the head are considered in detail. The mechanism of death soon after trauma is also analyzed. Dogs morphinized for analgesia were used in the experiments. A variety of preparations were made prior to head injury in different animals: spinal-cord section at the first thoracic level; bilateral adrenalectomy; bilateral vagus-nerve section and carotid-artery ligation and section; intravenous administration of yohimbine to remove the influence of the sympathetic system; and bilateral supratentorial exposure of the brain. Electroencephalographic studies were made in 9 animals and the findings were analyzed with reference to medullary function.

The acute responses to injury are divisible into 3 types: (1) minimal, (2) moderate, and (3) profound. In moderate and profound injuries there is usually a sudden increase in blood pressure with respiratory loss, unconsciousness, loss of corneal reflexes, and frequent generalized rigidity followed by limpness. In moderate injuries the animals survived or died, while in the group with profound injuries they almost always died. Under morphine analgesia the ability to respond to pain was considered an adequate sign of consciousness. Loss of the corneal reflexes repre-

sents a more profound response to injury than unconsciousness.

Evidence of vagal paralysis was common in moderately and severely injured animals, but in some there was evidence of vagal stimulation and bradycardia. In the group of animals in which the vagi and carotid arteries were sectioned, injury to the head caused responses similar to those seen in the intact animal except that there was no change in the pulse rate. In adrenalectomized animals injury caused the usual rise in blood pressure, associated with respiratory failure. It was believed that the increase in blood pressure in this group was not mediated by a humoral factor (adrenalin liberation). In animals with previous spinal-cord section and resulting low blood pressure, severe head injury with eventual profound effect was never associated with hypertension. It seems reasonable to assume that if the spinal cord had been intact, there would have been the usual acute hypertension following trauma. When an animal was given an amount of yohimbine sufficient to prevent a rise in blood pressure on injection of ¾ cc. of adrenalin solution, injury to the head was never associated with an increase in blood pressure. These two groups of experiments suggest that the sympathetic nervous system mediates the acute peripheral hypertension which is encountered in head injury.

In several animals with bilateral craniotomy and exposure of the brain, a supratentorial bullet wound never caused a pressor effect, although the injury was severe. This indicates that the increase in blood pressure is brought about by medullary stimulation and not by stimulation of the supratentorial cortical or subcortical centers. In 4 animals the medulla or spinal cord was injured by gunshot. In 2 animals in which the region of the obex was destroyed, the pressor effect did not appear. In 2 animals with injury lower down, a marked pressor response appeared in one and an increase in pulse pressure in the other. It is apparent that a dissolution of the vasomotor center itself causes the death of the animal, while if the vasomotor center is allowed to remain intact with energies acting upon it from a distance, its first discharge is one of peripheral vasoconstriction with consequent increase in the blood pressure. It is conceivable that in some experiments a depressor mechanism may be the cause of a drop in pressure, but paralysis of the vasomotor center itself is usually the cause of circulatory failure and death. The presence of intracranial vasodilatation with peripheral vasoconstriction need not necessarily be construed as evidence of traumatic stimulation of a depressor mechanism, since it may happen with any other factor causing peripheral vasoconstriction.

Respirations were affected in a multitude of ways. In general the respiratory response did not appear to be dependent upon vasomotor activity. Respiratory paralysis is a direct result of injury to the respiratory center. The respiratory center or the vasomotor center, or both, may be affected by trauma.

Electroencephalographic changes did not correlate with medullary involvement. Evidences of medullary paralysis could be obtained without a simultaneous inactivity of the brain waves, and, conversely, in some animals the electrical activity of the brain failed in the presence of respiration and corneal reflexes.

JOHN L. LINDQUIST, M.D.

SURGERY OF THE THORAX

TRACHEA, LUNGS, AND PLEURA

Pierson, P. H.: Primary Carcinoma of the Trachea. *J. Am. M. Ass.*, 1944, 126: 206.

A man of sixty-one who had intermittent bouts of severe cough, dyspnea, suffocation, and moderate hemoptysis for three years was found to have a primary adenocarcinoma of the trachea. An attempt to prove the histogenic origin from an aberrant thyroid by the use of radioactive iodine was unsuccessful. After removal of as much as possible of the tumor through the bronchoscope, the remnant was treated with radium applied within the trachea. Two years after treatment there are no subjective or objective evidences of tumor. HOWARD A. MCKNIGHT, M.D.

Jones, J. C., and Thompson, W. P.: Arteriovenous Fistula of the Lung. *J. Thorac. Surg.*, 1944, 13: 357.

In a single white woman, twenty-four years of age, a provisional diagnosis of arteriovenous aneurysm of the right lung was made on the history of cyanosis since birth, the persistent secondary (or symptomatic) polycythemia, the presence of a continuous murmur over the tumor mass in the right lung, clubbing of the fingers, and a normal heart. Later planigraphic studies indicated that there were several masses in the right lung instead of the one tumor mass indicated by the ordinary roentgenogram, that their arterial vascular supply might be separate from those of the upper and lower lobes, and that the tumor masses might be made up largely of dilated branches of the pulmonary artery going to the right middle lobe.

After a few months of tentative collapsing of the right lung by means of pneumothorax, the chest was opened through a curved inframammary incision, extending from the third intercostal space anteriorly, under the right breast and upward and laterally to the third rib in the midaxilla. There was no semblance of a middle lobe; roughly corresponding to where the middle lobe should normally be there was attached to the anterior and inferior aspects of the upper lobe a reddish-blue pulsating mass the size of a lemon with a paper-thin wall. Tapes were passed around what appeared to be the pulmonary artery, which was large and dilated, and around the inferior pulmonary vein. No superior pulmonary vein was seen, either at operation or in the specimen afterward. Occlusion of the pulmonary artery suppressed the pulsation in the mass, and occlusion of the inferior pulmonary vein caused the tumor to become larger and more distended; it also caused some superficial varicosities over the surface of the upper lobe to become more prominent. This direct communication between the pulmonary artery and the inferior pulmonary vein was shown, after removal of the lung, on the operatively removed specimen by the injection of a bismuth medium through the inferior pulmonary vein directly into the pulmonary artery supplying the tumor mass and from here on into the arterial branches supplying the entire lung.

A right total pneumonectomy was done by dissection and individual ligation; first, the pulmonary artery was cut between transfixion sutures, then the inferior pulmonary vein; finally, the lung was amputated distal to a clamp applied to the right main bronchus. The right bronchus was closed with eight over-end single stainless steel, 35-gauge wire sutures, which were tied after the clamp was removed. The mediastinal pleura was closed after thorough irrigation of the stump and of the pleural cavity with saline solution and after 5 gm. of sulfanilamide crystals were sprinkled over the bronchial stump. The ribs were brought together with pericostal sutures and the chest wall was closed in layers without drainage.

Following the operation the cyanosis disappeared within a few hours, the wound healed per primam, and the blood picture returned to normal within a few days. Four months later the patient was well, active, free of dyspnea and cyanosis; the physical findings were completely normal with the exception of clubbed finger ends, and this finding was definitely less in degree. Fluoroscopy showed the right chest to be almost filled with fluid, above which was air.

In the discussion, ADAMS presented lantern slides showing the photographic appearance, roentgen studies, and blood and oxygen studies of a male workman, twenty-four years of age, suffering from repeated attacks of epistaxis, with marked cyanosis, and clubbing of the fingers and toes. Following operation there was an immediate fall in the red-cell count and hemoglobin content, and a restoration of oxygen values to approximately normal.

JANES again discussed his cases, which had been already described in the *British Journal of Surgery*. He believes that many of these lesions are missed, even by the pathologist, and suggests that we keep hemangiomas in mind as a possible explanation of serious pulmonary bleeding not otherwise explicable.

BIGGER tentatively suggests the possibility of curing the fistula by ligation of the pulmonary artery. In this connection, however, JONES, in his closing statement, said that he would rather sacrifice the lung in this case than attempt to dissect out any of the branches or even to leave the lung in and ligate the pulmonary artery. JOHN W. BRENNAN, M.D.

Forbes, G. B.: Chylothorax in Infancy. *J. Pediat.*, S. Louis, 1944, 25: 191.

Chylous effusion in infancy is so rare that a review of the literature in 1941 contained only 10 cases in infants under one year of age. This report concerns a six-weeks-old infant with spontaneous bilateral

chylothorax. Animal experimentation has demonstrated that ingested vitamin A appears quickly in the thoracic duct lymph. In cases of chylothorax, ingested vitamin A is recovered quantitatively from the chyle, but carotene given by mouth can be recovered only to the extent of 20 per cent of the amount fed. This study was repeated in this patient with similar results. In addition vitamin D absorption tests were made on this patient and absorption into the chyle was found to be similar to that observed for vitamin A.

The characteristics of the chyle were studied by the author. The infant survived slightly over two months, during which time a total of 5,300 cc. of chyle were removed. The total protein varied from 2.72 to 2.97 gm. per cent; the albumin-globulin ratio was about 4 to 1. This severe protein loss required intensive therapy consisting of blood, plasma, and chyle transfusions.

In adults some observations have been recorded on the intravenous administration of chyle. Four of 9 cases were improved; in 3 no response was obtained, and in 2 cases sudden death occurred, possibly due to an anaphylactic reaction. This patient received a total of 14 chyle infusions ranging from 60 to 100 cc. in volume without reactions. The authors believe that reactions could hardly be due solely to anaphylaxis as chyle normally enters the blood stream. The extensive loss of protein, fat, and electrolytes through repeated aspiration of chyle warrants the intravenous use of the fluid removed. No cause for the effusion was found in this patient. THOMAS F. THORNTON, JR., M.D.

Sampson, H. H., and Collis, J. L.: Postlobectomy Lobar Collapse. *J. Thorac. Surg.*, 1944, 13: 435.

Since lobectomies have been performed for bronchiectasis, postoperative collapse of the remaining lobe on the same side has been a perpetual stumbling block in the path of good results. Postoperative collapse may cause increase in mortality, prolonged convalescence, or a poor result. Poor results are due to the development of bronchiectasis in the collapsed lobe. One such case is cited by the author.

Secondary collapse has been attributed to such factors as reflex bronchial spasm, swelling of the mucosa due to bronchography, swelling of the stump, or the absence of adhesions to aid in expansion of the lobe. Certain bronchoscopic observations made by the authors have led them to advance another theory. At bronchoscopy, swelling of the hilum was not noted. The collapse always appeared to be caused by obstruction with sputum, and re-expansion of the lobe always occurred when the sputum was removed. Finally, when the lower lobe is removed, the upper-lobe bronchus is found to open almost directly upward so that it is parallel to the stump of the lower lobe bronchus. This is due to expansion of the upper lobe in an effort to fill the cavity produced by removal of the upper lobe. In a patient who has an ineffective cough due to pain the stump easily fills with pus which spills over into the upper lobe. The extent of symptoms depends entirely upon how much pus works into the smaller bronchi.

In practice, bronchoscopy has provided satisfactory treatment. In adults usually one bronchoscopic examination suffices although it may have to be repeated in children. The authors have observed 12 cases of postoperative collapse in 33 cases of lobectomy. All have responded well to bronchoscopy. To date, postural drainage has been the only method of prophylaxis that has reduced the incidence of the condition.

THOMAS F. THORNTON, JR., M.D.

Lewis, R. M.: Muscle-Splitting Thoracoplasty. *J. Thorac. Surg.*, 1944, 13: 431.

Head and Wangensteen have described methods for performing thoracoplasty with a relatively low shock factor, small wounds, and, therefore, a smaller potential space for the development of infection. In some far advanced cases of tuberculosis, internists and patients have been inclined to refuse operation because of the severity of the classical type of thoracoplasty.

The authors have adopted Head's technique for use in far advanced cases and in those with mixed empyemas. Cosmetic and functional results are improved because of small incisions and because the muscles of the shoulder girdle are not severed. In mixed empyemas the infected field may be avoided until the final stage is performed.

Since 1942 the authors have performed 79 stages upon 21 patients with mixed empyemas or for advanced cavernous disease. Results were uniformly good, except in 2 patients with extensive bilateral disease. Modifications of the instruments and technique are discussed.

THOMAS F. THORNTON, JR., M.D.

Paulino, F., and Loureiro, R. L.: Bilateral Thoracoplasty (Toracoplastia bilateral). *Tr. hosp. Miguel Pereira*, 1944, ser. 1, 23.

The possibility of bilateral thoracoplasty was first demonstrated experimentally on dogs and monkeys by Kinsela in 1930, and the first successful operation on a human being was performed by Gravesen in 1931. The operation has been performed in a limited number of cases since that time. It is indicated only when bilateral artificial pneumothorax is impossible and only if the patient is in good enough general condition so that survival and benefit from the operation seem probable. The amount of lung tissue involved does not seem to be so important for the success of the operation as the distribution of the cavities. Almost all of both upper lobes may be removed and the patient survive, but if cavities are distributed throughout the lungs the operation is impossible.

There is some difference of opinion as to which side should be operated on first, but most surgeons prefer to operate on the side that is in the worst

condition. The first operation is borne better by the patient and the treatment of the worst side may have a favorable effect on the disease in the other side—it may even render operation on that side unnecessary. At any rate, when the lesions on the first side are cured, operation on the other side is less dangerous.

German, Argentine, and Brazilian surgeons prefer to operate under local anesthesia by infiltration with 0.5 per cent novocain with adrenalin added. The American, French, English and Scandinavian surgeons use general anesthesia with gases. The authors believe that local anesthesia permits closer observation of the respiratory condition during the operation.

It is best to divide the bilateral operation into several stages, the arches of not more than three or four ribs being resected at one time. In the second operation the greatest care should be taken not to reduce the respiratory field too suddenly. Total resection of the first three ribs followed by extrafascial apicolysis by Semb's method should be the first stage in the second thoracoplasty. This extrafascial apicolysis is an indispensable means of furthering collapse of the apex, and often reduces the number of ribs that have to be resected. The interval between the two operations must be long enough to permit reossification of the periosteum.

The authors describe 4 cases they have operated upon and illustrate them with roentgenograms. In the first the indication was primary, that is, both upper lobes were involved at the time of the first operation; in the others it was secondary, that is, the lesions in the second lung developed after the first operation. In the first operation they resected the whole of the first and second ribs, and then after a few minutes' observation of the respiration, pulse, and blood pressure, they resected the arcs of the other ribs down to the fifth. Too much of the fifth rib should not be resected. In 2 cases they used Semb's technique with resection to the fourth rib. In both of these cases they had excellent collapse without serious disturbance of the circulation. In 1 case in which the patient's general condition was serious, a resection to the sixth rib had been performed previously. They resected to the fifth rib on the other side in two stages and the results were good. In the only case in which they operated under general anesthesia they were able to resect only to the third rib on account of intense tachypnea. The amount of collapse obtained in this case was insufficient.

In their first case the interval between the operations on the first and second sides was only two weeks, the shortest interval known. In this case there was an intense fibrous reaction and pronounced rigidity of the mediastinum, and the extent of the lesions and the amount of expectoration necessitated the second operation in the shortest possible time. The course in this case was the most favorable of any case they have seen.

AUDREY G. MORGAN, M.D.

HEART AND PERICARDIUM

Taylor, H. K., and McGovern, T.: Angiocardiography: Anatomy of the Heart in Health and Disease. *Radiology*, 1944, 43: 364.

Angiocardiography had its beginning in 1928 when Robb and Weiss started their studies on cardiac physiology and circulation time. At present the method in use is the result of investigations by Forssman, Castellanos, and Robb. This type of examination affords a means of determining the size and shape of the heart, the presence or absence of cardiac hypertrophy, chamber enlargement, or both; also, the location of the valves and the position of the chambers, the ventricular conus, the pulmonary aorta and its branches, the aorta, and the border-forming structures of the cardiac silhouette.

The normal appearance of the heart chambers and the large vessels is described, as are the changes observed in size and shape in cardiac patients. The study is based upon observations made on 120 persons, 18 of whom were normal; the remainder had some form of cardiovascular disease. Certain variations from the accepted roentgenographic picture of the normal cardiac silhouette were demonstrated. The middle cardiac segment is formed most often by the left pulmonary artery, infrequently by the pulmonary aorta, and sometimes by both. The descending aorta may also participate. The ventricular conus is deeply situated. It is never a border-forming structure and is quite removed from the middle cardiac segment.

THOMAS F. THORNTON, JR., M.D.

Proescher, F., and Baumann, F. W.: Abnormal Origin of the Left Coronary Artery with Extensive Cardiac Changes in a Female Child Thirteen Months Old. *J. Pediat.*, S. Louis, 1944, 25: 344.

A case of abnormal origin of the left coronary artery is reported. The patient was a thirteen-month-old female child who had a history of repeated attacks of fever, coughing, and wheezing. The patient was admitted to the hospital because of one of these attacks. Physical examination showed flatness of the left lower chest, decreased breath sounds, and crepitant rales. The clinical diagnosis was pneumonia of the left lower lobe of the lung. The child died suddenly fifteen hours after admission.

Autopsy revealed a greatly enlarged heart which occupied the left lower thorax and caused the lower lobe of the lung to be completely atelectatic. The heart was 11.5 by 7.5 cm. and weighed 180 gm. The normal weight of the heart for an infant of this age is about 42 gm. The increased size of the heart was due to left ventricular enlargement. The right coronary artery originated from the right sinus of Valsalva. It was normal in size and had a normal distribution. No vessel originated from the left sinus of Valsalva. Instead the left coronary artery originated from the left pulmonary artery about 2 mm. above the valve. Its orifice was pinpoint in size and

it represented the entire blood supply to the left ventricle as there was no anastomosis between the right and left coronary arteries.

The histological findings were different from the so-called genuine hypertrophy, in which there is an increase in the muscle fibers without degenerative changes. In this case there were extensive degenerative changes with replacement by connective tissue and calcification.

The case herein reported brings to 18 the number of infants in whom this anomaly has been reported.

FORREST D. DODRILL, M.D.

Harrington, S. W.: Chronic Constrictive Pericarditis: Partial Pericardiectomy and Epicardiolysis in 24 Cases. *Ann. Surg.*, 1944, 120: 468.

Chronic constrictive pericarditis is the term most generally accepted to designate an inflammatory lesion of the pericardium and epicardium in which fibrous adhesions often associated with deposits of calcium and occasionally pockets of encapsulated fluid form on and between these coverings of the heart, and in which the inflammatory scar contracts around and onto the heart muscle to such a degree that it interferes with the normal diastolic and systolic functions of the heart and causes impairment of the circulation.

The two most common conditions with which constrictive pericarditis is most likely to be confused clinically are cirrhosis of the liver and congestive heart failure from intrinsic cardiac disease. In most instances, however, the subjective symptoms of constrictive pericarditis are sufficiently characteristic so that when they are correlated with the physical and laboratory findings a definite diagnosis can be established.

The development of factors which produce the clinical syndrome of constrictive pericarditis is slow but progressive. The amount of blood entering the heart and being pumped into the circulation by the heart per beat and per minute gradually decreases. This decrease results in low blood and pulse pressure, faint heart sounds, tachycardia, a paradoxical pulse, and auricular fibrillation. The back pressure on the venous circulation results in high venous pressure, dilatation of the veins, enlargement of the liver, and transudation of fluid into the tissues of the body, particularly into the abdomen and pleural cavities, as well as into the tissues of the extremities and face.

The number and severity of subjective symptoms increase progressively with the course of the disease; the earliest symptoms are general weakness and fatigue. Dyspnea is noted on exertion and usually is relieved by rest, particularly by lying down. Orthopnea is experienced rarely. Digestive disturbances, such as anorexia, epigastric distress, and fullness in the abdomen after meals, usually are not noticed until after the liver is enlarged considerably, and probably they can be attributed to hepatic damage for these symptoms seem to be more severe in cases in which the tests of hepatic function reveal a considerable degree of retention of dye. Swelling of the abdomen does not occur early in the course of the disease; however, it may be one of the first symptoms noticed by the patient. When ascites develops, it usually becomes progressively more extensive. Edema of the extremities which may extend to the face and neck usually does not occur until after ascites has been present for some time. When venous congestion has advanced to this degree, the entire venous system usually is dilated markedly. This dilatation is particularly noticeable in the veins of the cervical region. The effects of this condition cause increasing disability, which gradually becomes total disability unless surgical relief is obtained.

The laboratory findings in chronic constrictive pericarditis give valuable aid in establishing a definite diagnosis. The venous pressure is elevated above normal. The circulation time of the blood is increased. The tests of hepatic function indicate a varying degree of hepatic damage which depends to some extent on the duration of the disease.

Roentgenological studies of the heart in cases of constrictive pericarditis usually reveal it to be normal or smaller than normal, occasionally slightly enlarged but never markedly enlarged or segmentally dilated as in congestive heart failure from intrinsic cardiac disease and hypertensive heart disease. The presence of calcareous plaques in the pericardium is noted frequently. This is always suggestive of the possibility of a constricting pericardium, but calcium may occur in the pericardium without other findings of constrictive pericarditis.

The preoperative preparation of patients who have been selected for surgical treatment is directed at removing the effects of the circulatory failure from the constriction of the heart and at improving the function of the structures involved.

The intake of fluid should be limited to from 1,200 to 1,500 cc. in twenty-four hours. Patients should receive a diet high in protein and low in salt. Daily administration of vitamins may be of value in improving the general resistance of the patient. When tests of liver function indicate considerable damage, vitamin B complex and glucose administered intravenously or by mouth may be helpful in improving the function of the liver.

The body cavities and tissues should be relieved of as much excess fluid as possible. When large amounts of fluid are present in the abdominal and pleural cavities, the fluid should be removed by aspiration, and periodic use of diuretics should be made to relieve edema of the tissue and keep it at a minimum.

The value of preoperative administration of digitalis is questionable.

The level of blood urea, plasma chlorides, and serum protein, and the carbon-dioxide-combining power of plasma are determined routinely before operation to see that they are within normal limits as well as for control of the postoperative determinations. The type of the patient's blood is determined, and blood of similar type is held available for intrav-

venous administration at the time of operation if it should be required because of loss of blood or severe decrease in the blood pressure. Blood or other fluids, however, should not be administered intravenously during operation unless their use is indicated specifically.

Preliminary medication is begun the night before operation and consists of 1½ gr. (0.1 gm.) of pentobarbital sodium taken orally. Two hours before operation another dose of 1½ gr. (0.1 gm.) of pentobarbital sodium is administered by mouth. Often this dose is repeated an hour before operation. From thirty to forty-five minutes before operation 1/6 gr. (0.01 gm.) of morphine sulfate and 1/150 gr. (0.00043 gm.) of atropine sulfate are administered hypodermically. Morphine should be used with caution and in sufficiently small amounts so that it will not interfere with respiratory function. Amounts vary with the age and condition of the patient. The author believes that it is advisable to omit its use for children less than fifteen years of age.

General anesthesia is advisable because the operation may require considerable time. This time factor is tiring for the patient and if general anesthesia were not employed, the nervous strain would be increased considerably and would interfere with cardiac function. Furthermore, if respiratory difficulties arise, it is advisable to have the patient under complete control. The anesthetic agent is administered by means of a positive-pressure apparatus. The author uses an intratracheal tube routinely. For the anesthesia he uses cyclopropane with ether.

The patient is placed in a straight dorsal position, on the operating table.

A U-shaped skin incision is made to approach the pericardium extrapleurally through the left anterior portion of the thoracic wall. This incision begins at about the anterior axillary line at the level of the sixth rib; it extends across the thorax to the sternum; the apex of the curve is in the midportion of the sternum and the upper end of the incision extends as high as the third rib on the anterior axillary line.

The pectoralis major muscle is dissected and is reflected with the skin flap. The costal cartilages of the sixth, fifth, fourth, and, in some instances, of the third ribs on the left side are resected subchondrally and subperiosteally from the sternum together with 3 cm. of the corresponding ribs. An intercostal muscle flap is then cut from the left border of the sternum and the intercostal vessels are cut and ligated. The internal mammary vessels are ligated in the upper and lower limits of the wound in the thoracic wall, usually beneath the perichondrium of the third and sixth costal cartilages. After the muscle flap is mobilized, any existing pericardial attachments to the sternum are separated and a portion of the left half of the sternum is resected with the rongeur. In some instances it is not necessary to remove any of the sternum beyond the detachments of the cartilages.

The left pleura may be dissected from the pericardium at this time. The pleura, however, is often adherent, particularly when the pericardium is calcified, and openings may be made inadvertently into the pleura during its separation. Any openings, thus occurring in the pleura, are immediately closed with catgut. In cases in which only a little pericardial space is free of pleural attachments and in which the pleura is thin and adherent to the outer wall of the pericardium, it is not advisable to make a wide separation of the pleura from the pericardium until after dissection of the pericardium from the myocardium has been made because of the danger of opening the pleural cavity at this early stage of the operative procedure. Inadvertent opening of the pleural cavity at this time may result in pulmonary collapse and respiratory difficulty which may interfere seriously with the patient's progress throughout the rest of the operation. Usually, sufficient exposure of the heart can be obtained to complete the dissection of the adherent pericardium from the myocardium without separating the attachment of the left pleura to the pericardium until resection of the pericardium is about to be performed.

The initial incision into the pericardium is important. An attempt is made to make the incision in a region which is removed from the underlying coronary vessels. The site usually selected is close to the sternum or well over the left ventricle in order to avoid injury to the anterior descending portions of the left coronary vessels. The site of election depends to some extent on the type of scar and accessibility of the myocardium. Great care should be exercised to ascertain the point of fusion of the pericardial scar and the myocardium before removal of the epicardium is started. The separation of the epicardium from the myocardium is very important and is done in addition to the resection of a portion of the epicardium and pericardium; it extends over a much wider area of heart muscle than the area from which the scar is resected. The site of fusion of the epicardium and myocardium often varies greatly, particularly when deposits of calcium are present. In some instances the calcified tissue may extend into the heart muscle and great care is required in removal to avoid serious injury to the heart muscle. During removal of this scar the deposits of calcium should be left attached to the reflected pericardium. In some regions, particularly around the deposits of calcium, the fusion plane is not uniform and the dissection must be carried around the deposit in slightly different planes before removal by sharp dissection can be done. When the calcium invades the heart muscle, no attempt should be made to remove it as the tissue involved may extend entirely through the heart muscle. In instances in which the scar tissue has extended into the heart muscle, small segments of scar should be left attached to the myocardium because of the risk of damaging the muscle or the coronary vessels in their removal. In many instances the scar presents irregular lines of cleavage. It often extends into the myocardium at different levels. In these instances it is best not to follow one line of cleavage to the point of injury to the myocardium

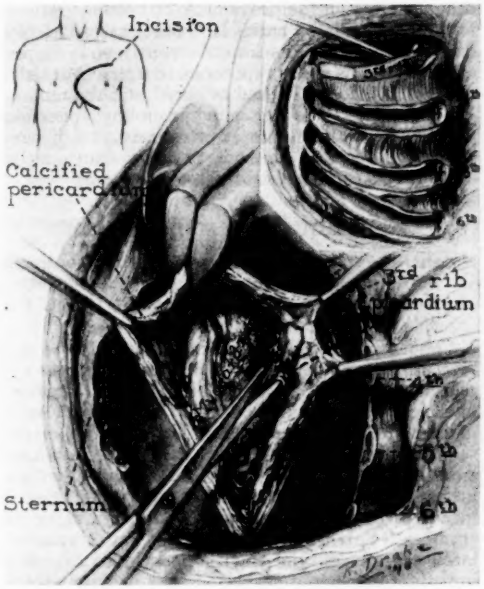


Fig. 1. Sharp dissection of the constricting epicardium (epicardiolysis) and pericardium from the myocardium. Bone cutters were required for resection of the scar because of the thickness of the calcification. Left inset, U-shaped precordial incision. Right inset, Approach to the pericardium through the wall of the thorax. Resection of the cartilages and 2 cm. of the third, fourth, fifth, and sixth ribs on the left side (resection proximal half of sternum).

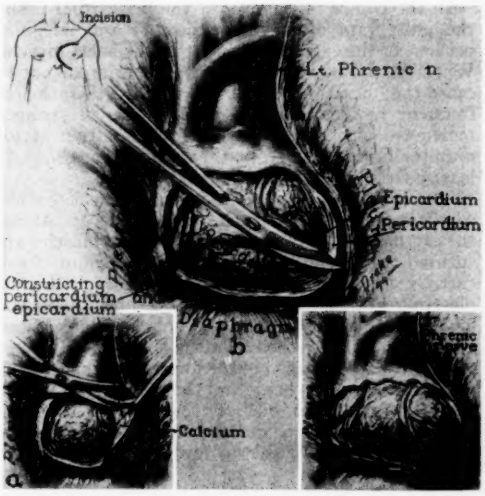


Fig. 2. Resection of, and marginal incisions in, the pericardium and epicardium after separation from the myocardium. Inset a, Beginning resection of the pericardial scar from the anterior and larger surface of the myocardium. b and Inset c, After resection of the pericardial scar, multiple incisions are made into the cut margin of the remaining epicardium and pericardium to release the heart more fully, particularly at the apex. (Courtesy of J. B. Lippincott Co.)

but to shift into another line of cleavage and then separate the intervening bands to avoid myocardial injury.

An attempt is always made to free the left ventricle first because better function of this chamber of the heart should be established to provide better disposal of the blood before freeing the right side of the heart. In many instances, however, the author has separated the greater portion of the right ventricle first without harmful effects.

Opinions differ concerning the amount of pericardial scar that it is necessary to remove as well as the amount of scar to be separated from the heart muscle and from the orifice of the inferior vena cava. The author believes it is advisable to separate as much of the pericardial scar as possible from the ventricles, the right auricle, and orifice of the inferior vena cava, and it is of particular importance to separate the attachment of the right ventricle to the diaphragm. It is of equal importance to separate the apex of the heart, and the author believes that this should be done early in the operation if possible. Separation of the heart muscle from its fixed attachments to the diaphragm is one of the most important considerations in reestablishing the action of the heart. Improvement in the function of the heart often is noted immediately after the apex and right ventricle have been separated from their fixed attachment to the diaphragm.

After the scar has been separated from the heart muscle, the amount of pericardium to be resected depends on the character of the scar and the position and type of fixation of the pleural attachments to the outer wall of the pericardium. The author believes it is advisable to resect as much of the anterior portion of the pericardium as possible without injury to the pleura. By careful dissection the pleural attachments to the pericardium can be separated to approximately the position of the left phrenic nerve and the entire anterior portion of the thickened pericardium extending beneath the sternum is resected. If the attachments of the pleura extend high on the pericardium, as they often do when calcium is present, it may be impossible to resect an adequate amount of pericardium without injury to the pleura. In these cases linear incisions into the remaining cut edges of the pericardium will produce a much wider opening of the pericardium.

The importance of separating and removing sufficient scar to release the heart cannot be overestimated because, if an adequate amount is not removed, cardiac action will continue to be impaired. This not only will eliminate the possibility of ultimate recovery from the disease but will interfere with the immediate recovery from the operation.

In the course of removal of the pericardial tissue the pulse rate often becomes rapid and irregular because of the external stimulus to the heart muscle. When the pulse becomes irregular, it is important to cease the operation temporarily. The utilization of frequent rest periods and applications of sponges moistened with warm physiological solution of sodium chloride will permit the heart to regain or at least partially regain its former rhythm.

The upper half of the wound down to the bed of the cartilage of the fifth rib is closed in two layers. Above the cartilage of the fifth rib the intercostal muscles are sutured to the sternum. The perichondrium of the cartilages of the fifth and sixth ribs is excised completely. From the cartilage of the fifth rib to the lower angle of the wound the subcutaneous tissue and skin only are closed over the heart. Soft rubber tissue drains are placed in the lowermost angle of the wound between the heart and the diaphragm. These drains permit the immediate removal of the serous exudate from the precordial space. The drains are removed from thirty-six to forty-eight hours after operation.

A varying amount of serous exudate always follows removal of the adhesions, even though great care is taken to prevent trauma to the tissues as well as to attain accurate hemostasis. If this fluid is permitted to accumulate in the precordial space, it may interfere with the function of the heart which is already laboring under increased stress from the operation. If it is not permitted to drain externally, the fluid may rupture into the pleural space and interfere with respiratory function. When granular deposits of calcium are scattered throughout the pericardium, it is particularly advisable not to have this material drain into the pleural cavity because of the risk of pleural irritation and empyema.

Immediately after operation all patients are placed in oxygen tents. The time during which the administration of oxygen is continued depends on their progress. This is one of the most important aspects of postoperative treatment, for the oxygen not only prevents cyanosis but aids in relieving stress on the heart. Other postoperative measures are directed toward removal of body fluids and aiding the function of the heart and liver. These measures are similar to those utilized preoperatively for similar purposes. Limitation of the intake of fluid is important; from 1,200 to 1,500 cc. of fluid is administered in twenty-four hours by proctoclysis or by mouth as soon as nausea subsides. The intravenous administration of fluids is avoided if possible. In instances in which the urinary output is reduced, from 10 to 20 per cent solution of glucose may be administered intravenously. This not only aids the urinary output but may benefit the function of the liver. Vitamin B also is given.

In 24 cases the operative mortality was 25 per cent. Of the 18 patients who recovered from operation, 9 are considered "cured" in the sense that subjective symptoms were relieved and the patient was rehabilitated to his former or some other useful occupation. The improvement of 2 more patients has approximated a cure. In 2 other cases in which operation was recent, improvement has been progressive. Thus 13 of this series of 24 patients ultimately may be considered as cured. Of the remaining 5 patients who recovered from the operation, 2 have shown moderate improvement and 3 have died. Two of these deaths were due to continuation of the disease and 1 was due to pneumonia.

ESOPHAGUS AND MEDIASTINUM

Haight, C.: Congenital Atresia of the Esophagus with Tracheoesophageal Fistula: Reconstruction of Esophageal Continuity by Primary Anastomosis. *Ann. Surg.*, 1944, 120: 623.

Congenital atresia of the esophagus is found at a level corresponding to the junction of the upper and middle thirds of the esophagus. The upper portion of the esophagus ends as a blind pouch in almost all instances. The upper end of the lower esophageal segment usually enters the trachea, thus forming a tracheoesophageal fistula; this occurred in 29 of the 32 patients in the author's series. The condition is incompatible with life, as feedings cannot enter the stomach. Furthermore, the feedings and accumulated secretions in the blind upper segment overflow into the trachea and death soon results from aspiration pneumonia. Reconstruction of esophageal continuity by a single-stage operation consisting of an extrapleural closure of the tracheoesophageal fistula and an anastomosis of the esophageal segments offers the most satisfactory approach to the correction of the anomaly. A primary anastomosis of the upper and lower esophageal segments was done in 16 of the 24 patients for whom an exploration of the anomaly was undertaken. Six, or 37.5 per cent, of the 16 patients are living from seven months to three years and one month after the operation, and the reconstructed esophagus is patent in all instances.

The suspicion of a congenital obstruction of the esophagus is aroused by attacks of choking, dyspnea, and cyanosis on attempts to swallow fluids. An actual obstruction of the esophagus can be demonstrated by the inability to pass a catheter into the stomach. To be certain that the obstruction is complete, iodized oil is given by mouth under fluoroscopic observation. A dilated blind upper esophageal segment, terminating usually at the level of the second or third dorsal vertebra, is then evident. In the presence of a verified complete obstruction of the upper esophagus, the existence of air in the stomach is indicative of a communication between the lower esophageal segment and the trachea or a bronchus. The absence of air in the stomach is suggestive, but not necessarily diagnostic, of an absence of a tracheoesophageal fistula. The absence of a tracheoesophageal fistula can be determined also by bronchoscopic examination.

The diameter of the upper esophageal segment has always been of ample size to permit an anastomosis, but the length may interfere considerably with the

performance of an anastomosis. If the upper segment is short and the lower segment reaches only to the tracheal bifurcation or to a main bronchus, the difficulties are augmented. An unusually narrow diameter of the lower segment, a short length of the lower segment (agenesia), and a low position of the tracheoesophageal fistula were the important factors which prevented anastomosis in 6 of 7 patients.

Not bronchoscopy, but exploratory operation offers the final criterion regarding the possibility of satisfactory reconstruction of the esophagus in those cases in which the presence of a tracheoesophageal fistula is evident because air is seen in the stomach.

The surgical problem is essentially a threefold one involving (1) the correction of the esophageal obstruction so that aspiration pneumonia will not occur, (2) the ligation of the tracheoesophageal fistula so that gastric contents cannot enter the trachea, and (3) the provision of some means for feeding the infant. Older methods have largely been supplanted by two plans that are now fairly well standardized insofar as surgical principle is concerned.

One plan, the indirect approach, consists of a three-stage procedure: (1) extrapleural ligation of the tracheoesophageal fistula; (2) exteriorization of the upper esophageal segment; and (3) gastrostomy. This indirect plan is essential for the maintenance of life if the anatomic conditions are such that a primary esophageal reconstruction is impossible.

The other plan, a direct approach to the problem, advocated by the author, consists of a reconstruction of esophageal continuity by a single-stage extrapleural ligation of the tracheoesophageal fistula and a primary anastomosis of the esophageal segments. Feedings by mouth can be started soon after the operation. If leakage of the anastomosis does not result in an external esophageal fistula or a recurrence of a tracheoesophageal fistula, further operations are avoided.

The technical objection to the plan of primary anastomosis results from the fact that tension is invariably present at the site of the anastomosis. Tension occurs primarily because of the gap that often has to be overcome when the two segments are approximated. The weak tensile strength of the wall of the underdeveloped lower segment is a further technical disadvantage of the direct plan and makes advisable in all cases the complete relaxation that is obtained by general anesthesia, so as to permit the segments to be approximated as readily as possible.

Preoperatively, the pulmonary status is carefully determined by physical and roentgenological examinations. If the infant is cyanotic, mucus should be aspirated from the pharynx and oxygen therapy should be started promptly. From the time that a diagnosis has been made, the patient is placed in the prone position with the foot of the bed elevated. This position favors the drainage of oral secretions to the exterior and lessens the tendency of aspiration of pharyngeal secretions. The position is changed to the alternate lateral positions at frequent intervals to favor drainage from the upper lobes and thereby lessen the tendency for the development of an atelectasis of the upper lobes. Parenteral fluid consisting of a 3 or 5 per cent solution of dextrose in distilled water is given, preferably by the subcutaneous route. A blood transfusion is ordinarily not given before operation; its use is deferred until the time of operation. Ascorbic acid and vitamin K are routinely employed as preoperative measures.

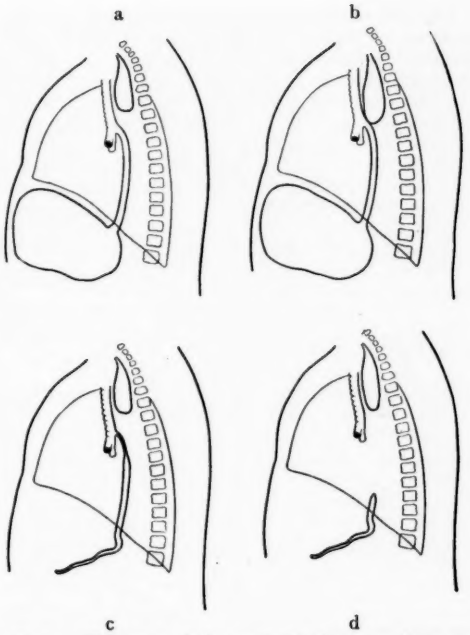


Fig. 1. The types of the anomaly that have been encountered at operation in 23 of the 24 cases upon which exploratory operation was performed are illustrated. (One patient died during operation before the nature of the lower segment was determined.) a, The most frequent type of malformation of the esophagus. The upper esophagus ends as a blind pouch. The lower esophagus arises from the trachea at a level that is usually between 0.5 and 1 cm. above the bifurcation of the trachea. Air is present in the stomach which indicates the presence of a tracheoesophageal fistula. This type of anomaly was present in 13 of the 24 patients upon whom a primary exploration of the anomaly was performed. Variations in the location of the fistula were found, and in 2 cases the lower esophagus arose from the right stem bronchus. *b*, Partial muscular continuity of the two segments. The anomaly otherwise is the same as in *a* (5 cases). *c*, The lower segment is greatly contracted for a variable distance below its origin from the trachea and air has not entered the stomach, although a tracheoesophageal fistula was present (2 cases). In a third case, the lower segment was contracted, but air was present in the stomach (not illustrated). *d*, Atresia of the upper esophagus and agenesia of the lower esophagus. The stomach does not contain air (2 cases). (Courtesy of J. B. Lippincott Co.)

Ligation of the tracheoesphageal fistula and anastomosis of the esophageal segments can be performed through either a right or left extrapleural approach. In the 24 patients in the author's series for whom an exploration was carried out, the left extrapleural approach was used in 12 and the right extrapleural approach in 11. In the more recent cases in this series, the right extrapleural approach was used in preference to the left, because of the greater ease in obtaining the exposure of the lower esophageal segment.

The author describes the details of the operative technique using the right and the left approach, respectively.

The percentage of operative recoveries following anastomosis was 37.5. Pneumonia occurred in most of the fatal cases. JOSEPH K. NARAT, M.D.

Adams, R., and Hoover, W. B.: The Management of Stricture of the Esophagus. *J. Thorac. Surg.*, 1944, 13: 383.

The common disease conditions of the esophageal wall with obstruction are: (1) cancer of the esophagus, (2) esophageal diverticulum, (3) cardiospasm, (4) web (both with and without the Plummer-Vinson syndrome), (5) cicatricial stricture secondary to caustic burns, (6) cicatricial stricture secondary to peptic ulcer or esophagitis (often associated with peptic ulcer below the esophagus), (7) cicatricial stricture secondary to tuberculous glands of the mediastinum, and (8) congenital developmental anomalies. They have been named in the order of greatest frequency.

The method of treatment of esophageal strictures is dilatation of the narrowed area. A satisfactory result is obtained when the dilatation is sufficient to allow the passage of a regular diet without difficulty. Until this is accomplished, the diet may be altered to admit its passage through the narrowed esophagus.

The amount of dilatation or distention that may be obtained in tissues by the application of pressure is, to say the least, amazing. In the esophagus may be seen diverticula that have become as large as a grapefruit, and the esophagus may attain a circumference of 10 inches as the result of continued pressure from its fluid content, and the added pressure exerted by the muscles of deglutition.

Passage of the instrument through the esophagus is fraught with danger, for trauma to the esophageal wall may result in mediastinitis, while perforation or rupture produces mediastinitis, except in rare instances. The mediastinitis spreads rapidly and terminates fatally in almost all instances unless radical measures are taken to drain the infection and limit its spread. In such cases the judicious use of the sulfonamides and penicillin must not be overlooked.

The authors review their experiences in the procedure of dilatation of the esophagus for some of the conditions mentioned. They stress particularly the problems they encountered. They have found that it helps a great deal to pass a thread either above or below (in all cases in which this is possible) when dilatation is attempted, or when the esophagoscope or bougies are used. PAUL MERRELL, M.D.

Ferrari, R. C., and Iturraspe, M. C.: Megaesophagus. Esophagogastrostomy by the Thoracic Route (Megaesofago. esofagogastrostomia por via torácica). *Bol. Acad. argent. cir.*, 1944, 28: 509.

Megaesophagus may be treated by dilatation or by operation. The authors describe in detail 2 cases that they operated on and refer to 2 others operated on by colleagues; in all of these successful results were obtained.

The first patient was a farmer forty-five years of age who began to have difficulty in swallowing solid foods in 1940 and then for six months the difficulty had extended to swallowing liquids. He had lost 10 kgm. in weight. In January, 1943 he was hospitalized with a diagnosis of cancer of the cardia. On operation the cardia was found hard and fibrous but with no palpable glands. A Witzel gastrostomy was performed, but without success, and he was sent to the authors for treatment. Roentgen examination showed the dilated esophagus to be filled with retained fluid; it also showed a megasigmoid. This was the second case of this type that the authors have seen. The ninth rib was resected for a length of 18 cm.; 3 cm. of the eighth rib were resected at the posterior angle. The pleura was opened and the phrenic nerve was sectioned over the pericardium. A radiating section of the diaphragm was made about 10 cm. from the esophageal opening. The rigid cardia was adherent to the esophageal opening; these adhesions were cut. The esophagus above the cardia was enlarged to about twice its normal size. A lateral anastomosis not involving the cardia was performed between the esophagus and the body of the stomach. Because of the relation of the cardia to the esophageal opening, operation by the abdominal route would have been impossible. Recovery was normal and the results were good. The patient can swallow normally and there is no regurgitation. A supplementary operation was performed on the sigmoid sphincter to relieve the stubborn constipation from which he suffered.

The second patient was an Italian fifty-three years of age in whom a Witzel gastrostomy and dilatation were performed before esophagogastrostomy was decided on. The gastrostomy was done under local anesthesia and the final operation under cyclopropane-ether given by tracheal intubation, just like in the first case. Recovery was uneventful, and the functional result was good in this case also.

The discussion was devoted to the relative merits of the thoracic and abdominal routes in this operation, with general agreement that the thoracic route is to be preferred when the surgeon is skilled and the operation is performed in a hospital where all necessary apparatus is available.

In closing, the author said that these were two different operations. In the abdominal operation the esophageal opening is dilated to bring down the esophagus to the stomach, but the pillars of the

diaphragm remain intact and function of the diaphragm is preserved. However, in the thoracic operation the diaphragm is paralyzed by section of the phrenic nerve and radiating incisions are made in the diaphragm. These destroy the esophageal opening, and a true hernia of the stomach through the diaphragm is brought about. This cannot have any action on the anastomosis and naturally the results of this operation are better.

AUDREY G. MORGAN, M.D.

Harrington, S. W., and Moersch, H. J.: Surgical Treatment and Clinical Manifestations of Benign Tumors of the Esophagus, with a Report of 7 Cases. *J. Thorac. Surg.*, 1944, 13: 394.

The occurrence of benign tumors of the esophagus is relatively infrequent. Their subjective symptoms and clinical manifestations are often meager, which not only delays their clinical recognition but also makes it difficult. These growths are potentially malignant and their treatment is of special interest to the surgeon because extensive operative procedures may be required for their removal.

These benign tumors may be divided into two main groups: the mucosal and the extramucosal tumors. The mucosal tumors are often pedunculated and arise from the submucosa. They usually are fibrolipomas or fibromyxomas and are covered by normal epithelium of the esophagus. The extramucosal, or intramural, tumors arise from the muscle of the wall of the esophagus; they do not involve the mucosa and usually are leiomyomas.

The growth of benign tumors of the esophagus is usually slow and the tumors may attain considerable size without giving rise to subjective symptoms. This is true particularly of the intramural tumors, which rarely produce obstruction of the esophagus unless they attain great size. The common symptoms associated with these growths are dysphagia, substernal pain, regurgitation of food, cough, and dyspnea. The pedunculated tumors are commonly associated with obstructive symptoms and the diagnosis of these growths is often definitely established by regurgitation of the tumor into the mouth, which may be the first subjective symptom. Regurgitation of these growths into the nasopharynx can imperil life because of their blocking the trachea, which may result in strangulation.

The roentgenographic and roentgenoscopic examination of the esophagus is of great value in determining the presence of these growths. Esophagoscopic examination is of utmost importance in establishing a definite diagnosis, although at times it may be difficult to determine the site of origin as well as the type of growth because it is difficult to obtain a specimen for biopsy through the normal esophageal mucosa. The site of origin of the pedunculated tumors usually can be determined definitely.

The indications for surgical treatment of benign tumors are not as urgent or as imperative as for malignant lesions of the esophagus. They depend somewhat on the patient's general condition, the amount of difficulty the tumor is causing, and the site of the tumor. Inasmuch as these growths may undergo malignant change, surgical treatment should be considered in all cases.

Fig. 1. Cystic tumor originating from the anterior wall of the middle third of the esophagus, displacing the esophagus to the right (and posteriorly), causing marked compression of the right main bronchus, moderate compression of the left main bronchus, and widening of the corynal angle. Tumor is adherent to the right portion of the pericardium. Upper right insert shows posterolateral incision for transpleural removal of the tumor. Left lower insert shows repair of the esophagus at the site of the tumor.

The surgical treatment of these tumors depends on whether the growth is submucous or pedunculated, or on whether it arises from the outer portion of the muscular coat of the esophagus. The pedunculated tumors may be more accessible and amenable to surgical treatment than the intramural tumors. If the pedunculated tumor is small and its origin is high at the introitus, it may be removed through the mouth with a snare and cautery. Larger tumors of this type require cervical esophagotomy. These tumors may attain such huge size as to require transthoracic esophagotomy. This approach also may be necessary if the pedicle of the tumor is situated low in the esophagus.

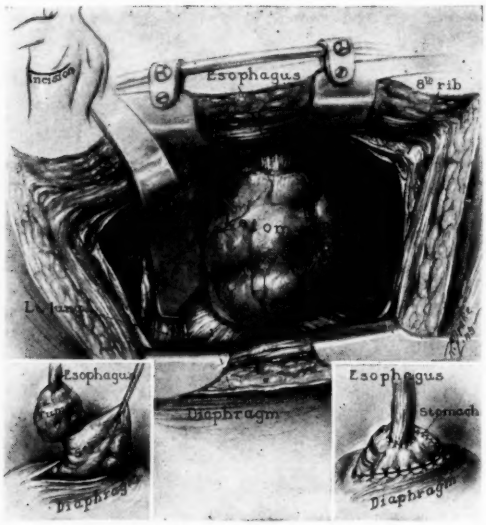


Fig. 2. Resection of the lower fourth of esophagus for removal of a leiomyoma. The stomach was transposed into the thoracic cavity (lower left insert), and the esophagus was anastomosed to the anterior wall of the stomach (lower right insert).

The indications for surgical treatment of intramural tumors are not, as a rule, as urgent as those for pedunculated tumors because intramural tumors do not usually cause obstructive symptoms. The surgical treatment of these tumors often requires a much more extensive operative procedure than is necessary in cases of pedunculated tumors. If the intramural tumors involve only a segment of the wall of the esophagus they may be removed by local excision of the tumor from the wall of the esophagus, which is then reconstructed. If the growth involves the entire esophageal wall, its removal will require resection of the esophagus, which entails a greater operative risk.

In 5 of the 7 cases which the authors report esophagotomy was performed; in 1 case resection of the esophagus was done; and in 1 case the tumor was removed orally with a snare and cautery.

MISCELLANEOUS

D'Abreu, A. L., Litchfield, J. W., and Hodson, C. J.: Intrathoracic Metallic Foreign Bodies. *Lancet*, Lond., 1944, 247: 265.

In a series of 264 severe chest casualties 92 had retained intrathoracic missiles. In 50 cases operative removal was thought necessary, and in 49 of these the missile was found and removed. Operative removal of foreign bodies 1 cm. or more in diameter is attempted in view of the risk of infection, hemorrhage, and structural damage. Operation for the removal of missiles is delayed until the alteration in physiology due to the injury is overcome. On the other hand, too long a delay is not advisable because dense adhesions may form. The foreign body must be accurately localized by x-rays and fluoroscopy. If the missile is not easily found at operation portable films should be taken.

A total of 25 patients had missiles removed from the lung; in all but 1 the foreign body was a shell fragment. In 5 cases infection was present. Adhesions and palpable tracks leading to the missile were found frequently. Occasionally cavities were present about the metal. In 3 cases calcified nodes near the fragment made identification difficult. In only one case was a lobectomy necessary.

Fourteen cases of pleural foreign bodies were subjected to operation. They offered no special problems when properly localized. Two pericardial and 3 mediastinal fragments were removed. Three missiles were localized in the heart; in 2 of the cases the missiles were not causing symptoms and exploration was not done; in the third case exploration was done but the foreign body was found to be in the interventricular septum and could not be removed. This patient died, as did 1 of the patients who had a missile removed from the lung. These were the only operative deaths. THOMAS F. THORNTON, JR., M.D.

Lorenz, E.: Radioactivity and Lung Cancer; a Critical Review of Lung Cancer in the Miners of Schneeberg and Joachimethal. *J. Nat. Cancer Inst.*, 1944, 5: 1.

Because of the growing conviction in the United States and abroad that radiations emitted by radon inhaled for long periods of time or emitted from radioactive deposits in the lungs will cause cancer of lung in man, the author, Mr. Egon Lorenz (a senior biophysicist of the National Cancer Institute of the United States Public Health Service), has presented this review of the literature on pulmonary cancer in the miners of Schneeberg and Joachimethal. The conviction is based on the fact that primary carcinoma of the lung accounts for 50 per cent of the causes of death of the miners of Schneeberg and Joachimethal. These mines contain radon, especially where pitch blend is mined. With the use of ever-increasing amounts of radon in industries, it is important to know whether radiations from radioactive substances will induce pulmonary tumors. Schneeberg is in Germany and Joachimethal is in Czechoslovakia. The author gives a brief history of the mining activities of these two regions. In addition, he stresses the living, working, and social conditions of the two areas. The article quotes the findings of a great number of men who have studied and obtained material both from the histories and autopsies of individuals in the two regions. Harting and Hesse reported findings as early as 1879. They found that in 75 per cent of all deaths the cause was lung cancer and that the incidence was greater in miners than in masons or carpenters working in the mines. In 1912 Arnstein reported statistical data showing

that from 1875 to 1912, 276 miners had died of cancer of the lung, 64 of tuberculosis, 119 of other lung diseases, and 206 from other causes. He was the first to diagnose the cancer as squamous-cell carcinoma. Uhlig in 1921 and Beyreuther in 1924 described isolated cases of lung cancer. Others who have reported include Rostoski and Saupe, Ludwig, Lorenser, and many others.

The author, in reviewing the literature from the many who have reported, has attempted to correlate the histories, the autopsy findings, and the living conditions under which these miners work. He then quotes literature giving the radium content of the minerals present, also the radon content of the area in the mines. After this, animal experiments with the animals under conditions similar to those in the mines were made. The animals used included rats, mice, and rabbits. The author gives the conditions under which the animals were studied, the amount of exposure to radon, and then the necropsy findings.

In summarizing the findings he states: we find that large doses of x- or y-rays to the lungs (doses in which the total absorbed energy was above 10^6 ergs per cc. of tissue) have not produced lung tumors. Therefore it seems unlikely that the miners of Schneeberg and Joachimethal exposed daily to the concentration of radon of 3×10^{-9} curies per liter for twenty years should develop lung cancer, as the total energy absorbed during that time per cubic centimeter of lung tissue amounts to only approximately 1×10^3 ergs. The energy absorbed in the lungs of the mice of Read and Mottram during 161 days was of the same order of magnitude. No lung lesions were found in these mice. Certain strains of mice have a high susceptibility to spontaneous lung tumors and others a low one, but generally the statement of Slye, Holmes, and Wells holds: "It seems that man exhibits lung tumors exceptionally infrequently, and that mice show an even more exceptional prevalence of tumors of this organ." Evans states: "It will be noted from these data that rats and mice are about 40 times as resistive as humans to lesions caused by a-rays when all dosages are expressed in erg units. The extrapolation of the results of animal experiments to man must recognize this great difference in susceptibility."

This statement seems not to be justified as far as the effect of radon on lung tissue is concerned.

Therefore, the opinion that radon is the sole cause of the lung cancer of the miners cannot be maintained. The contributing factors in the case of the miners which were already brought up in the different investigations discussed may include the following: pneumoconiosis produced by the dust in the mines, chronic irritation caused by respiratory diseases, arsenic, radioactive substances, and perhaps a hereditary susceptibility. The mines have been operated for hundreds of years. As frequently is the case in Europe, the occupation of the father is taken over by the son; the miners live in isolated places, and inbreeding often occurs. All these factors may lead to a hereditary susceptibility. However, no statistical evidence on this point has ever been collected.

PAUL MERRELL, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Sidel, N., and Wolbarsht, A.: Spontaneous Pneumoperitoneum from an Unknown Cause. *N. England J. M.*, 1944, 231: 450.

Pneumoperitoneum may be a spontaneous, diagnostic, or therapeutic condition. When it is encountered, except in the form induced for diagnosis, there is usually some lesion in the gastrointestinal tract as the causative factor. Perforation of a viscus is the usual cause; in some cases, the perforation is a slowly developing leak rather than a sudden puncture.

A case of spontaneous pneumoperitoneum, without demonstrable cause and without symptoms, is reported. The pneumoperitoneum was discovered accidentally during the course of pneumonia. Subsequently, the condition spontaneously disappeared. No gastrointestinal abnormality was found in the history, laboratory tests, or on x-ray investigation. There was x-ray evidence of the marked pneumoperitoneum and of its complete disappearance after a three-month interval. SAMUEL KAHN, M.D.

GASTROINTESTINAL TRACT

Colp, R., Klingenstein, P., Mage, S., and Druckerman, L. J.: Subtotal Gastrectomy for Duodenal Ulcer. *Ann. Surg.*, 1944, 120: 170.

For six years a definite program has been followed on patients suffering from peptic ulcer. Under this program 173 cases were treated, with special emphasis on preoperative management, anesthesia, operative technique, and postoperative care.

Statistics are presented in table form showing the duration of the disease. The important facts in history, analysis of age and sex, choice of operation, pathology, type of gastrointestinal anastomosis, and an analysis of pertinent data as to deaths are given.

Gastric analysis showed a uniformly high acid gastric content. Gastroscopic examinations were of no direct value in cases of duodenal ulcer. A high protein diet was used to combat hypoproteinemia. Inhalation anesthesia used during the first three years gave way to continuous spinal anesthesia.

Retrocolic gastrojejunostomy has in turn been replaced by an antecolic isoperistaltic anastomosis. Jejunostomy was used as a complementary or supplementary procedure when indicated. A lower mortality in the second group was attributed in part to spinal anesthesia, the wider use of drainage of the duodenum, the antecolic type of anastomosis, and the frequent use of jejunostomy for alimentation.

The high mortality resulting from early operations on bleeding ulcers will be combated in the future by allowing the patients to convalesce to a nearly normal state before radical surgery is attempted.

RICHARD J. BENNETT, JR., M.D.

Bremer, J. L.: Diverticula and Duplications of the Intestinal Tract. *Arch. Path.*, Chic., 1944, 38: 132.

The group of anomalies comprising the enterogenous cysts, intestinal duplications, and the like is divisible into two smaller classes on the basis of embryologic origin. Most of the spherical cysts are derived from true diverticula, which are frequently found projecting from the ventral or antimesenteric surface of the tube in embryos of the eighth or ninth week, and are normally absorbed later. Abnormally they continue to grow: if restricted by the intestinal muscle, they bulge within the lumen, but if they pierce the muscle layers, outward expansion is not limited and they may become large cysts attached to the intestine. Their wall is necessarily thinner than the gut wall.

A few of the spherical and most of the tubular structures represent true duplication, which originates by an abnormal persistence of the vacuoles normally present among the massed cells of the "solid stage" of the intestine, a phenomenon of growth in embryos of the sixth or seventh week. By the confluence of a chain of vacuoles a new channel is formed, parallel to the original lumen, and this channel becomes separated from the latter by a union of the intestinal layers between the two. Since the duplication develops within the intestine, the outer wall of the duplicate portion always contains all of the tissue layers of the intestine. The duplicate lumen usually lies between the leaves of the mesentery but may be entirely separated, with a mesentery derived by the splitting of the original. It may open into the main lumen at one or more places, or become a closed cyst. Theoretically, three or more channels are possible, the main lumen and two or more confluent chains of vacuoles.

The duplicate structures assume many forms, some of which are shown and described, and are often associated with other anomalies. In the tubular portions the mucosa tends to resemble that of the parent tube, but in bulbous or cystic portions it changes to the gastric type. Great internal pressure may destroy mucosa of any type.

JOHN E. KIRKPATRICK, M.D.

Kaufman, L. R., and Heiman, H. I.: A Case of Spontaneous Gastrojejunal Fistula Eight Years after an Operative Gastrojejunostomy. *Surgery*, 1944, 16: 557.

A spontaneous gastrojejunal fistula occurring eight years after an operative gastrojejunostomy is unique. There is no similar case recorded in the literature, nor has one ever been reported by any other physician.

A seventy-year-old white woman was admitted to the Metropolitan Hospital, New York, on April 1, 1943 on account of dysphagia, nausea, and the loss of 10 pounds in three months. She had had dyspepsia

and nausea since youth. A posterior gastrojejunostomy for duodenal ulcer made her comfortable and symptom-free for "the first time in her life." The patient appeared chronically ill, showed evidence of loss of weight, and a marked pallor.

On x-ray examination and fluoroscopy a normal esophagus was found; the stomach was enlarged and contained a five-hour residue, but no gastrojejunal stoma was visualized.

Gastric analyses revealed high total acid up to 75, high free acid up to 48, and high combined acid of 27; there was occult blood in the majority of the specimens.

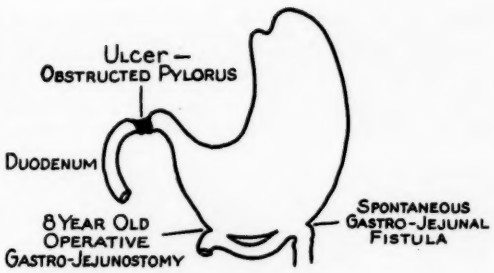
Gastroscopy revealed a patchy superficial gastritis, an adherent exudate, punctate hemorrhages, atrophic rugae, and a pseudovalve of the stoma with an opening large enough for easy and clear visualization of the jejunum. Many peristaltic waves indicated possible obstruction below the stoma; 2,000 cc. of gastric residue were found.

The treatment consisted of gastric lavages, transfusions, and the administration of liver and iron. The hemoglobin increased from 52 to 70 per cent with marked subjective and objective improvement.

Exploratory laparotomy was undertaken after three weeks with the intention of performing a subtotal gastrectomy. The stomach was greatly dilated. Adhesions of the anterior surface to the round ligament and to the parietal peritoneum were easily separated. An anastomosis was visualized at the usual gastrojejunostomy site; there were sharp angulations of proximal and distal jejunal loops. The apparent stoma was located in the transverse mesocolon at the edge of the colon in a large inflammatory mass about 11 by 4 by 7 cm. This mass was dissected from the colon and mesocolon, and then from the stomach. The jejunum attached to this mass was resected, and an end-to-end anastomosis was made. The gastric wall was inflamed and thickened for a radius of about 2 cm. around the anastomotic site. That portion of the wall was resected. Finger exploration through this opening revealed that distal to it was a wide orifice into what was thought to be the duodenum. "However, autopsy showed this orifice to be the original gastrojejunostomy; the 'anastomosis' was the spontaneous inflammatory gastrojejunostomy." The defect of the stomach wall was completely closed, and the rent in the mesocolon was sutured. While the stomach was open, a Levin tube was guided well into the small intestine.

In the postoperative period oxygen and several transfusions were given. The Levin tube was aspirated at intervals and large quantities of dark brown fluid were removed. Twenty-four hours after operation the patient suddenly went into shock and expired.

At autopsy the gastric mucosa was found to be reddened but not ulcerated. Rugae were not prominent. The pyloric region showed complete obstruction with an area of white scar tissue occluding the opening into the duodenum. An apparently well functioning anastomosis was present. Proximal to



this anastomosis was a sutured defect of the posterior gastric wall. In the descending loop of the jejunum, distal to the gastrojejunostomy, was an end-to-end anastomosis surrounded by some edema. The mesocolon was scarred and the transverse colon was thickened.

No new gastrojejunostomy was performed since the pylorus and the duodenum were assumed to be patent. Autopsy, however, showed that there was complete obstruction and that the old gastrojejunostomy was functioning normally.

The most discussed complication following this operation is gastrojejunal ulcer. Fistulas, when present, generally are gastrocolic, jejunocolic, and gastrojejunocolic. High acid values obviously cause recurrent ulcers, especially when the pylorus is closed. Most gastrojejunal ulcers are clinically similar to peptic ulcers.

The authors quote Alvarez: "Anything that interferes with the passage of duodenal contents over the jejunal mucosa around the stoma is likely to leave this region unprotected from the corrosive effects of gastric juice, and, therefore, subject to ulceration. Closure of the pylorus probably interferes with the maintenance of a good downward current in the duodenum, and the absence of food and gastric juice in the duodenum lessens the outflow of the protective bile and pancreatic juice." They also quote Lahey: "Pyloric obstruction is a predisposing factor for gastrojejunal ulcer since the highly acid gastric contents are dumped into the jejunum and cannot mix with the regurgitant alkalin contents."

Evaluating the pathology in this case, the authors assume two hypotheses: (1) the ulcer may have originated in the greater curvature of the stomach as a new ulcer, or (2) the ulcer may have developed as a jejunal ulcer about 8 cm. distal to the original gastrojejunostomy in a location where the impact of the acid chyme would be most likely to produce mucosal ulceration.

As the ulceration progressed through the serosa, inflammatory reaction could readily fix a distal segment of the original loop to the greater curvature as well as to the gastrocolic omentum since it was in close proximity to both. The resulting perforation is then readily understood.

MATHIAS J. SEIFERT, M.D.

Dixon, C. F., and Benson, R. E.: Closure of a Colonic Stoma. Improved Results with Combined Succinylsulfathiazole and Sulfathiazole Therapy. *Ann. Surg.*, 1944, 120: 562.

The oral administration of succinylsulfathiazole and the local application of sulfathiazole to the operative wound following closure of a colonic stoma have greatly improved the results obtained by the authors. Infection of the operative wounds occurred in 84 per cent, and a fecal fistula developed in 30 per cent of a series of 102 cases in which no sulfonamide drug was employed, whereas infection of the wounds occurred in only 13 per cent, and a fecal fistula occurred in only 2 per cent of 102 cases in which a combination of succinylsulfathiazole and sulfathiazole was administered. These improvements in the results are in a large part attributable to the new chemotherapeutic agent succinylsulfathiazole, and they indicate in general the usefulness of this drug in the management of surgical diseases of the lower intestinal tract.

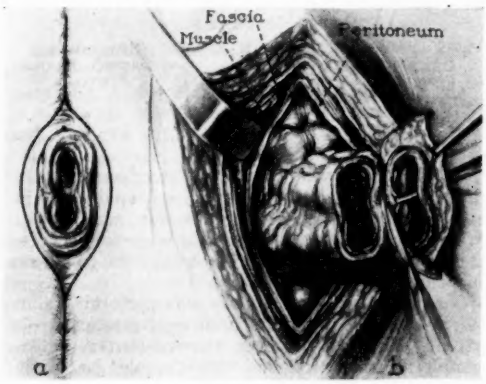


Fig. 1. Closure of colonic stoma. *a*, Incision in skin encircling the stoma. *b*, The fascial, muscular, and peritoneal layers have been incised and the proximal and distal limbs of the colon are mobilized. The previously encircled layer of skin and subcutaneous tissue is being excised from the wall of the bowel. The edges of the colonic stoma are freshened. (Courtesy of J. B. Lippincott Co.)

Fig. 2. The stoma has been closed transversely to the long axis of the bowel. The completed anastomosis is dropped back inside of the peritoneal cavity and 5 gm. of sulfathiazole are inserted.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Shallow, T. A., Eger, S.A., and Wagner, F. B.: The Conservative Management of Acute Pancreatitis. *Pennsylvania M. J.*, 1944, 47: 1199.

Acute pancreatitis is a disease of middle and late life, equally distributed between the two sexes and rarely occurring in the colored race. The authors observed 12 cases in two years. The cause of the disease is still disputed. The usual view is that it is due to a reflux of infected bile into the pancreatic duct, while some investigators believe it is due to a reflux of duodenal contents into the pancreatic ducts. A third view as to the etiology is a partial obstruction to the outflow of pancreatic secretion due to a metaplasia of the epithelium of the branches of the pancreatic duct, and still others believe acute pancreatitis results from a circulatory disturbance of the pancreas.

No one of the current theories adequately explains the mechanism of the production of the disease. There is autodigestion of the pancreas by its own secretion, but how the enzymes become activated is not well understood. The liberation of trypsin leads to digestion of the pancreas with necrosis, sometimes followed by suppuration. The tryptic digestion of blood vessels within the gland results in hemorrhage. The liberation of lipase is responsible for an important feature of the disease, namely, fat necrosis. Absorption of the split protein products or of the trypsin itself may account for the development of profound shock and death in the very severe cases.

There are two distinct pathological types of the disease: the common form, and, fortunately the milder, acute interstitial pancreatitis or acute pancreatic edema. In this condition the gland is grossly enlarged and hard and is surrounded by small areas of fat necrosis localized to the pancreas. Subsidence of the inflammation is accompanied by fibrosis. In the less common form, namely, the hemorrhagic type, there is blood-tinged fluid in the lesser peritoneal cavity. Some of this may find its way into the general peritoneal cavity. The pancreas grossly is enlarged, soft, and friable, and it may be black and

gangrenous. The areas of fat necrosis are abundant and are present not only over the pancreas but also are scattered in the mesentery and omentum.

The onset of acute pancreatitis is usually abrupt, often following a hearty meal, with severe epigastric pain sometimes radiating through to the back, left flank, or interscapular area. There is nausea and vomiting. In fulminating cases there may be cyanosis, prostration, and circulatory collapse. The significant findings are upper abdominal tenderness and rigidity. Tenderness of the left flank is present occasionally. Abdominal distention may be present. Occasionally there may be a bluish discoloration about the umbilicus or in the left flank. Jaundice is not infrequent.

Diagnosis by clinical signs alone is usually impossible but should be confirmed during the acute phase of the disease by a serum-amylase test. This test is practically specific for the lesion and seldom, if ever, gives a false positive reaction.

The authors believe that if a diagnosis is established clinically, operation should be delayed, and perhaps it should not be done at all. If the diagnosis is established at the time of operation the most conservative procedure aimed at correcting any obvious contributing factor should be done, but no extensive surgery on the pancreas itself.

In the authors' series of 12 cases there were an equal number of edematous and hemorrhagic types of lesions. There was no operative death which they attributed to delayed surgery or very conservative surgery. There was 1 death in the entire series.

EARL O. LATIMER. M.D.

Brunschwig, A.: The Surgical Treatment of Carcinoma of the Body of the Pancreas. *Ann. Surg.*, 1944, 120: 406.

Clinically, cancer of the body of the pancreas is manifested late in the course of the disease. While radical resection of such neoplasms is feasible, few patients are subjected to operation early in the evolution of these growths.

Six cases of resection of the body of the pancreas with splenectomy, and 2 cases of total pancreatectomy, with total duodenectomy and splenectomy, are recorded. The immediate operative mortality was 50 per cent (4 cases, including the 2 pancreatectomies). One patient with islet-cell carcinoma invading the entire body, and later manifesting hepatic metastases, lived three years and eleven months. Of the remaining 3, 2 survived five weeks and five and one-half weeks, respectively. Metastases were present at the time of operation, but the patients experienced appreciable amelioration of the severe abdominal pain. The third patient is living, comfortable, and in a fair general condition three months following resection of the body of the pancreas for carcinoma, and subtotal gastrectomy for metastases to the stomach. Metastases to the falciform ligament and umbilicus were also resected.

The technique for resection of the body of the pancreas has been evolved principally as a result of experience in recent years in excision of pancreatic tissue for hyperinsulinism. The steps in the technique of such resections employed in the cases reported by the author may be summarized as follows:

Preferably, continuous spinal anesthesia is used.

1. High midline, transverse of inverted-T incision.
2. Approach to the pancreas by transection of the gastrocolic omentum from the level of the head of the pancreas to the gastrosplenic vessels.
3. Retraction of the stomach upward, and of transverse colon downward.
4. At this point, the body of the pancreas may be excised in one of three ways, according to the expediency of each situation:
   a. Transection of the pancreas at the level of the neck, with resection proceeding distally from the body and tail; hemostasis is secured by ligation of the branches from the splenic vessels.
   b. Division and ligation of the gastrosplenic vessels; then transection of the neck of the pancreas and of the splenic artery and vein at this level, with excision of the body of the pancreas and spleen en masse, from the neck distally.
   c. Division and ligation of the gastrosplenic vessels, then elevation of the spleen by grasping it in the right hand; this brings the tail and body of the pancreas forward together with the splenic artery and vein. Transection of the neck of the pancreas and splenic vessels at the level of the superior mesenteric vessels, with excision of the body of the pancreas and spleen en masse.
5. Interrupted interlocking silk mattress sutures are placed about 0.5 cm. proximal to the cut edge of the remaining neck of the pancreas. The transected main pancreatic duct, if apparent, is grasped with a hemostat and ligated separately.
6. The transverse mesocolon is repaired except in the region below the pylorus. Here, one or two soft rubber drains are inserted to the site of pancreatic transection.
7. Closure of the abdominal wound.

In some instances of redundant stomach, the gastrohepatic omentum may be transected, the stomach retracted downward, and the body of the pancreas excised over the lesser curvature of the stomach.

Total duodenopancreatectomy and splenectomy for practically complete replacement of the pancreas by carcinoma was performed in 2 patients.

CHARLES BARON, M.D.

MISCELLANEOUS

Miller, T. G.: Intubation Studies of the Human Small Intestine. A Review of a Ten-Year Experience. *Gastroenterology*, 1944, 3: 141.

Presented as the Twentieth Lewis Linn McArthur Lecture of the Frank Billings Foundation, the author gives the results of investigations that have been under way in the Gastrointestinal Clinic at the University of Pennsylvania Hospital, Philadelphia, for the past ten years. They have grown out of a tech-

nique for intubation of the small intestine, and, more or less by chance, have led to a procedure of some practical importance in the management of patients with intestinal obstruction.

The technique of intubation permits many investigations of the function of the small intestine, including certain physical and chemical facts regarding the fasting contents at various levels, and the influence of certain factors on the characteristics of the fasting contents. For preliminary studies the tube was introduced when the subject was in a fasting state.

Fasting specimens obtained by 51 intubations in 30 normal subjects showed that the rate of flow of the contents averaged less than 1 cc. per minute; that the reaction, though usually acid in the duodenum and sometimes so in the jejunum, was essentially neutral throughout the ileum, and that the osmotic pressure, though lower in the duodenum, tended in the jejunum and ileum to be the same as that of the blood plasma (approximately 300 millimoles).

These conditions are altered when solutions are orally administered before the intestinal collections are made, because of gastrointestinal motility.

The influence of the ingestion of glucose and food was also studied, as well as the condition in isolated segments.

As glucose enters the gut a normal osmotic pressure is maintained by (1) a displacement of the chloride and bicarbonate ions, (2) an inflow of hypotonic fluid, (3) dispersion of the contents, and (4) absorption of the glucose.

For the preservation of normal conditions within the bowel after the admission of a hypertonic solution, nature employs at least one other procedure: an outpouring of mucus that acts as a blanketing layer between the mucosa and the irritant material.

From the beginning the Miller-Abbott tube was used in the development of a satisfactory technique for the study of absorption from the intestine.

By special methods, the author has been able to make some very preliminary studies on proteolytic digestion, as well as to study the effects of drugs on intestinal functions.

In intestinal obstruction, the chief merit of the two-lumened apparatus lies in the fact that it reaches the point of obstruction and so acts as an internal enterostomy, or, in the case of an adynamic ileus, as a deflator of the entire bowel. Wangensteen himself admits that his technique has two disadvantages; i. e., the tube does not reach the site of the lesion, and it does not permit use of the bowel above the lesion for purposes of nutrition. Both objections are overcome by intestinal intubation.

In addition to its principal actions—decompressing the distended intestine, aiding in the correction of fluid and electrolyte imbalance, converting emergency cases of obstruction to an elective surgical status, and rendering subsequent operation less hazardous—intestinal intubation also may be an aid in diagnosis. Not infrequently it is capable of localizing the site of an obstructive lesion and, by permitting the injection of a thin barium mixture at that point, it may give information as to its nature.

HARRY W. FINK, M.D.

GYNECOLOGY

UTERUS

Viergiver, E., and Pommerenke, W. T.: Measurement of the Cyclic Variations in the Quantity of Cervical Mucus and Its Correlation with the Basal Temperature. *Am. J. Obst.*, 1944, 48: 321.

The authors desired to measure accurately the amount of mucus in the cervix at various times in the menstrual cycle by using the basal body temperature shift as the method for fixing the time of ovulation.

The mucus from the cervical canal was withdrawn by aspiration with a glass cannula of known weight. The cannula was then weighed with the mucus, and the difference in weight determined the amount of secretion.

Daily vaginal temperatures on arising were taken and recorded.

The study was carried out on 4 subjects: in the first subject through six consecutive cycles; in the second through three nonconsecutive cycles; in the third for one cycle; and in the fourth through three consecutive cycles.

A total of 151 observations were made. In the group as a whole, the amount of mucus was increased from about the eighth through the eighteenth day. The individual peaks varied. The usual amount of mucus found preceding or following the days of increased secretion was about 60 mgm. During the periods of increased secretion the amount varied from 200 to 400 mgm. The viscosity of the mucus was usually low from the eighth through the sixteenth day. The maximum secretion of mucus preceded the temperature rise by at least one day.

The authors believe that this may be the explanation of the fact that some individuals failed to become pregnant, having had coitus after the temperature rise.

HENRY C. FALK, M.D.

Karnaky, K. J.: The Use of Diethylstilbestrol to Control Uterine Bleeding, *South. M. J.*, 1944, 37: 510.

The author attributes normal menstruation and dysfunctional uterine bleeding to fluctuations in the blood estrogenic level. If the estrogenic level is above or below certain limits, amenorrhea occurs. On the other hand, if the level is elevated into the bleeding range, or if the higher estrogenic levels are lowered into the bleeding range, endometrial bleeding will occur. The degree and rhythm of uterine bleeeding will depend upon intrinsic factors which influence the elevation and lowering of the blood estrogenic levels. These factors are dependent upon the metabolism of the granulosa cells.

The author states that all types of dysfunctional bleeding, even if due to fibromyomas, as well as amenorrhea, may be controlled by the use of large enough doses of stilbestrol.

Four hundred consecutive patients with multiple myomas which were associated with uterine bleeding were given from 5.0 to 25.0 mgm. of stilbestrol daily for from ten to sixty days. In all except 8 cases the bleeding stopped.

The method of treatment is as follows:

If the bleeding is severe, from 10 to 50 mgm. of stilbestrol are injected into the cervix, or given by mouth every fifteen minutes until the bleeding stops, which usually occurs in from two to twenty-four hours. Following this, from 5.0 to 10.0 mgm. are given by mouth each night for a period of from thirty to forty nights. Combined with the stilbestrol, thyroid and lipoidine are also given.

The author attributes the action of stilbestrol in the control of bleeding to inhibition of the gonadotropic hormones of the pituitary gland plus a diminution in tone of the uterine musculature, which is thought to be the result of increased vasodilatation in that area. The increased vasodilatation is followed by an absorption of irritating metabolites with a resultant lessening of the irritation of the smooth muscle.

Among a series of 3,227 cases, 89 per cent of the patients were able to continue the use of large doses of stilbestrol with only a transient period of nausea. The remaining 11 per cent were given elixir of phenobarbital to control a more pronounced gastrointestinal disturbance. In only 0.15 per cent was it necessary to stop stilbestrol because of gastrointestinal symptoms. The administration of large doses of vitamin C (800 mgm. daily) is said to reduce the incidence of nausea. No untoward physical effects were noted from the large doses of stilbestrol.

J. ROBERT WILLSON, M.D.

Ayre, J. E.: A Simple Office Test for the Diagnosis of Uterine Cancer. *Canad. M. Ass. J.*, 1944, 51: 17.

In 1941 Papanicolaom and Traut presented an office procedure for the early diagnosis of uterine cancer. This method employed the vaginal-smear technique.

Ayre presents a simple modification of this technique to make the test more rapid and more effective. This modification consists in taking the smear directly from the external os of the cervix. Here the concentration of cancer cells is greater. This was found to be the case in the series of cases studied. Although cancer cells may be found in the vaginal smear, the diagnosis should be confirmed by biopsy before operation or radiotherapy. The test is simple and rapid. The biopsy can be taken by any physician and sent to a laboratory for skilled interpretation. Every woman manifesting spotting of blood should have the benefit of a vaginal smear, and any positive or doubtful case should have a biopsy without delay.

The technique is presented, together with 2 cases illustrating the use of the smear diagnosis.

T. FLOYD BELL, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

MacClure, E., Olavo, J., and Oliveira, C.: Hydatidiform Mole of the Ovary (Mola hidatiforme do ovário). *An. brasil. gin.*, 1944, 18: 94.

The interest of the case presented lies in the fact that hydatidiform mole of the ovary is extremely rare. Novak found only 3 cases which had been reported.

The patient was a woman of twenty-one years who was admitted to the hospital with a diagnosis of ruptured ectopic pregnancy on the left side. A week before she had had intense abdominal pain followed by signs of internal hemorrhage. She was operated on immediately after admission. The uterus was found to be congested; the tubes were intact. The left ovary was ruptured and tissue resembling that found in the placenta protruded from the opening. This had been the source of the hemorrhage. A cuneiform resection of the ovary was performed and the wound closed. Uneventful recovery took place and the patient was discharged from the hospital on the eighth day.

Histological examination showed the typical picture of hydatidiform mole, localized entirely in the ovary. The later course and the demonstration of negative Aschheim-Zondek tests at the end of three and five months after the operation showed that the condition was benign. Photomicrographs of the findings are given in the original article.

AUDREY G. MORGAN, M.D.

EXTERNAL GENITALIA

Haas, R. L.: Genital Tuberculosis in the Female. *Am. J. Obst.*, 1944, 48: 69.

This study is based on a series of 62 cases seen over a period of twenty years. The patients ranged in age from fifteen to sixty-one years. Sixty per cent of the patients were between twenty and forty years of age when admitted.

The chief complaints which brought the patients to the hospital were: abdominal pain in 35 per cent of the cases, sinuses or fistulas in 16 per cent, vaginal bleeding in 11.3 per cent, and back pain in 11.3 per cent. All other complaints formed less than 5 per cent of the cases.

Although vaginal bleeding was the complaint in only 11.3 per cent of the cases, 58 per cent of the patients in the series complained of some change in the menstrual cycle. This was to be expected since the endometrium and ovaries were frequently involved.

Sterility occurred fairly frequently in this series. Forty-six patients were married and in the childbearing age. Twenty of these had not been pregnant, making the incidence of "infertility" 43.5 per cent. Forty-eight per cent of the patients had other active foci in addition to the genital lesion.

Eight patients in the series received nonoperative treatment. Four of this group had far advanced generalized tuberculosis and died on an average of three and six-tenths months after admission. Three were treated by bed rest, adequate diet, and ultraviolet light, and 2 were alive and well after ten and nine years, respectively. The third patient in this group died within eight months after admission. One patient with tuberculosis of the cervix refused treatment and is alive twenty years after being seen. She denies any symptoms, except amenorrhea at the present time.

Fifty-four patients were treated surgically, the abdominal cavity being opened in 39.

Complete pelvic exenteration, with total hysterectomy and bilateral salpingo-oophorectomy was done in 13 cases. In 13 additional cases the same treatment as in the first 13 was given, except that the cervix was not removed. In the remaining 23 cases all other operations, including vaginal hysterectomy, removal of cysts, posterior colpotomy, and drainage of abscesses, were done.

In this series there were fistulas or wound infections in 24 per cent. In the last 10 patients operated upon since 1936 there have been no wound complications.

The primary operative mortality was 5.5 per cent. Two patients died on the fourth postoperative day, one of pulmonary embolism and the other of peritonitis and intestinal obstruction. A third patient died on the nineteenth day of generalized tuberculosis.

All 62 patients in this series have been carefully followed up. Seventeen (25.8 per cent) are dead after an average of two and three-tenths years. Five died of causes related to pelvic tuberculosis or its extension. The remaining 12 died of causes other than pelvic, the most common being pulmonary and generalized tuberculosis.

Forty-five patients (74.2 per cent) are alive, an average of ten and one-half years after their original admittance. Over half of these (57.7 per cent) claim good health. Wound sinuses persist in only 2 patients.

HENRY C. FALK, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Hughes, T. D.: Syphilis in Pregnant Women. A Study Based on the Routine Wassermann and Kahn Tests Performed on 28,924 Patients. *Med. J. Australia*, 1944, 2: 273.

This examination of the blood for syphilis by means of the Wassermann test was commenced by the author in March, 1943, and the figures are carried forward to December, 1943. In all, 28,924 patients have now been tested, and 160 were found to give a positive reaction, which was checked in all of the cases. This gives an incidence of 0.55 per cent. As this is the largest series yet published in Australia, it should be a fair indication of the incidence of syphilis in pregnant women attending hospital "antenatal" departments. In a comparison of the incidence with that of other countries, it is difficult to assess its significance because of the mixture of populations and living conditions.

Of the 160 patients diagnosed as syphilitic, the records are available for 134. Potter and Adair state that spirochetes have not been demonstrated in the placenta or in the fetus before the fifth month of gestation; they state also that infection probably does not occur until about this time, that it is not a common cause of early abortion, but that it contributes to fetal mortality in the last half of pregnancy.

The following tabulation shows the previous obstetric history of 98 multiparas.

Group A: No miscarriages or other catastrophes, 41 (41.83 per cent).

Group B: One or more miscarriages, but no other catastrophes, 33 (33.6 per cent).

Group C: Prematurity, neonatal death, or stillbirth, 24 (24.5 per cent).

A tabulation of the previous obstetric history of 98 multiparas tends to support the statement that syphilis contributes to fetal mortality in the last half of pregnancy.

Group A. Forty-one, or 42.83 per cent, of the patients had no history of miscarriage, nor of premature labor, neonatal death, or stillbirth.

Group B. Thirty-three, or 33.6 per cent, of the patients had had a previous miscarriage but no other abnormality. In this group it must be realized that the pregnancies ranged from second to the fourteenth.

Group C. In this group the author found that 24, or 24.5 per cent, of the patients had a history of stillbirth, a neonatal death, or a premature birth. A further analysis of group C showed that some patients had experienced more than 1 catastrophe. This was illustrated by the patient who had had 7 pregnancies, 2 premature labors, 2 miscarriages, and 2 stillbirths.

The results of the present pregnancies, based on the records of 134 patients, are as follows:

One hundred and twenty children were born alive, 8 were stillborn, and 4 died in the neonatal period; there were 2 miscarriages. The combined stillbirths, neonatal deaths, and miscarriages numbered 14, or 10.4 per cent.

This figure of a combined stillbirth and neonatal death rate of 10 per cent is in contrast to the previous combined stillbirth and neonatal death rate of 24 per cent. All of the 134 patients, whose latest pregnancies were analyzed, received treatment, the adequacy of which depended upon how early in pregnancy they had reported to the out-patient department of the hospital.

The author makes the plea that the Wassermann test be made a part of routine "antenatal" examination of all patients. CHARLES BARON, M.D.

LABOR AND ITS COMPLICATIONS

MacLennan, H. R.: Contracted Pelvis in Childbirth: A Study of Its Morbid Effects on Mother and Child. *J. Obst. Gyn. Brit. Empire*, 1944, 51: 293.

It was found that contracted pelvis existed chiefly in the industrial centers in Scotland where the standard of living was low. The incidence of contracted pelvis varied with the incidence of rickets. Where rickets existed, contracted pelvis also abounded. Where rickets was not present, contracted pelvis was virtually absent.

The author reviewed a series of cases from the Glasgow Royal Maternity Hospital which deals with a larger number of contracted pelves than any other center in Britain. This series of 1,049 cases were admitted to the hospital over a period of two years. They comprised 15 per cent of the total admissions. The series was made up of 560 primigravidae and 489 multiparae. They were divided into 3 groups according to their pelvic measurements; a severely contracted group, in which the true conjugate was 3¼ inches or less; a moderately contracted group, in which the true conjugate was less than 3¾ inches but more than 3¼ inches; and a slightly contracted group, in which the true conjugate was 3¾ inches.

The mode of delivery offers evidence as to the dystocia which was present.

One of the most striking features was the dystocia caused by slight cases of contracted pelvis. Only 41 per cent of all primigravidas with slight contraction were able to deliver themselves spontaneously, and among the multiparas, only 56 per cent were successful in this respect. The others required operative interference, and that interference was of a major type in an unexpectedly large percentage.

Throughout the entire investigation it was noticed repeatedly that the cases of slightly contracted pelvis play a very large part in producing the morbid effects associated with contracted pelvis. This is a

point of considerable significance, in the first place, because the slight cases will tend to increase relatively in number as rickets diminishes in severity throughout the country, and, in the second place, because the slight cases may escape diagnosis.

It was observed in the incidence of cesarean section (309 cases in all) that the rate rose sharply from 21 per cent in primigravidas to 39 per cent in multiparas.

Thirty-one craniotomies and 53 high-forceps operations were necessary. Many of the patients were admitted to the hospital after an unsuccessful attempt at delivery with the forceps outside. The risks associated with failed forceps are already widely appreciated and the number of such cases occurring in the present series was 36.

The part played by the child in causing dystocia is an important factor. Unless a child is under average weight and not more than 6.5 pounds, there is a poor prospect of spontaneous delivery. In studying the averages of weights and the lengths of labor, it appeared that there was only a small margin of safety and that a difference in weight of 0.6 of a pound might affect the prognosis adversely. It was also noted with interest that, in cases of contracted pelvis of slight degree, severe dystocia occurs with a normal 7½-pound baby. However, a number of women deliver themselves spontaneously of babies of 7½ pounds, and, occasionally, of over this weight. The main reason for these spontaneous deliveries is that the patient has stronger uterine contractions, a greater endurance than normal, and is temperamentally suited to bear such pain. She may be said to have a satisfactory "labor equation." If this were not the case and if all patients had a similar labor equation, it would be found that the larger the baby, the longer the labor. The statistics show no such correlation. One woman may take longer to deliver a 6-pound child than another to deliver an 8-pound child. It may be assumed that an average woman with an average labor cannot deliver an average child if she has a contracted pelvis—be it slight, moderate, or severe. For a spontaneous vaginal delivery, the child must be below average weight, the mother must have stronger uterine contractions than the average, and she must be temperamentally capable of enduring them.

Stillbirth is more than four times more frequent in cases of contracted pelvis than in cases with normal pelves.

Protracted labor and instrumental delivery were followed often by puerperal sepsis. Twenty-five per cent of all the primigravidas and 18 per cent of all the multiparas were found to have puerperal morbidity.

The maternal mortality rate for the series was 21 per 1,000 (22 in 1,049). In the normal group it was 3 per 1,000. For the purposes of analyses the cases have been divided into 8 groups. The groups may be defined as follows:

GROUP I. The patient died immediately after dystocia associated with trauma, shock, or hemorrhage.

GROUP II. The patient died after dystocia associated with trauma, shock, or hemorrhage, followed later by sepsis or postoperative pneumonia.

GROUP III. The patient died after dystocia associated with trauma, shock, or hemorrhage, but a concomitant factor such as high blood pressure or pylonephritis, rendered the patient more vulnerable.

GROUP IV. The patient died after dystocia without undue trauma, shock, or hemorrhage, but delivery was followed by postoperative pneumonia, postoperative peritonitis, or other postoperative complication.

GROUP V. The patient died when measures had been taken to prevent dystocia, for example, early cesarean section, but were followed by shock, peritonitis, or other postoperative complications.

GROUP VI. The patient died from a condition unassociated with contracted pelvis, but dystocia was a contributory factor.

GROUP VII. The patient died from a condition unassociated with contracted pelvis, but contracted pelvis contributed in some way to the fatal issue.

GROUP VIII. The patient died from a condition unassociated with contracted pelvis, and the contracted pelvis did not in any way affect the fatal issue.

It will be seen that in the first 4 groups death followed dystocia; 67 per cent of the deaths fall into these groups.

In the 5th group death occurred following measures taken to prevent dystocia; 23 per cent of the deaths occur in this group.

In the 6th, 7th, and 8th groups contracted pelvis is either a contributory or only an incidental factor. These latter groups account for only 10 per cent.

It is important to consider what steps may be taken to improve the present position. The first and ultimate remedy must clearly be the prevention of rickets even in the mildest forms, for the investigation has shown that the slight cases of pelvic contraction give rise to as great difficulty today as do the severe ones. It is already well recognized that dietetic and social factors are primarily responsible for the production of rickets. The fact, however, that methods of preventing rickets are already well known, and that rickets in its grosser forms is something of a rarity to-day, leads sometimes to an attitude of mind which supposes that the danger of rickets has ceased to exist, whereas, in fact, the condition is still prevalent in minor degrees. By being minor and "masked" it is all the more dangerous to female children when they reach the childbearing age and are discovered to be suffering from contracted pelvis. It will be readily admitted that the first line of defense against rickets is the care of the child by a healthy and intelligent mother. The value of the antenatal clinic cannot be overestimated from the viewpoint of the mother's general health. The nourishment of the mother during pregnancy, and particularly during lactation, may be of primary importance in producing or preventing rickets in the offspring.

There are two main defects in the system. The first is nonattendance. The second defect is failure on the part of the mother to utilize adequately the advice given at the clinic or by her doctor. This may be through lack of education or facilities.

The investigation has attempted to show the advantage that would be gained if every case of contracted pelvis were recognized before labor, so that provision for skilled treatment could be made in ample time. The earlier recognition of contracted pelvis implies an improvement in the general level of antenatal pelvimetry.

In the hospital the greatest care is required for accurate estimation of the degree of deformity present. Today this can be done most satisfactorily by means of roentgenological pelvimetry. It is, of course, essential that one of the well proved methods should be chosen.

In a trial of labor, when the size of the pelvis has already been ascertained, it is essential for the obstetrician to acquaint himself with the quality, duration, and frequency of the uterine contractions. Not only is the quality of uterine contractions of importance, but the patient's capacity to endure strong contractions must also be borne in mind.

The purpose of this work was to draw attention to the rachitic pelvis which causes such disaster to the mother and her child. The remedies are in our hands. We must apply them.

CHARLES BARON, M.D.

Tollefson, D. G.: Methergine (Synthetic Lysergic-Acid Derivative), A New Oxytocic. Preliminary Report. *West. J. Surg.*, 1944, 52: 383.

Methergine is d-lysergic acid d-l-hydroxybutylamide-2, a synthetic ergonovine derivative. The availablity of methergine may come to represent an outstanding achievement in ergot chemistry and therapy because of the scarcity of adequate quantities of rich crude ergot of rye, high in alkaloidal content.

Hemorrhage, next to infection, is the most common cause of maternal mortality. The hemorrhage occurring in the third stage of labor is due to failure of the uterus to contract; therefore, any medication which insures a rapid and prolonged effect is a valuable adjunct to our therapeutic armament.

Since the use of analgesia is almost routine in modern obstetrics and the relaxing effect of these pain-relieving drugs cannot be denied, it seemed that the use of medication in a group of pregnant patients would be the best possible test.

To 200 patients who received as a minimum, 6 gr. of nembutal and 1/100 gr. of scopolomine (many had additional medication and almost all had cyclopropane for delivery), 1 cc. of methergine containing 0.2 mgm. of lysergic acid d-1-hydroxybutylamide-2 was given intravenously as soon as separation of the placenta was in progress. The usual signs of separation are not always reliable, but in this series the placenta was palpable in the cervical opening. The action of the oxytocic was rapid, and was apparent, on an average, in forty-eight seconds. As soon as this contraction was palpated, simple expression was practiced and the placenta was expelled almost immediately. Blood loss in this series averaged 98 cc.

During the puerperium, methergine was given in doses of 3 tablets daily for several days, and involution of the uterus proceeded satisfactorily. In this series the lochia was noticeably reduced.

The last 200 patients delivered remained in the hospital on an average of eight and four-tenths days. Nine patients have been readmitted to the hospital because of excessive flow. Two patients had been given methergine, and both were curetted—one on the twenty-second day, the other on the seventeenth day. Normal endometrium was removed in one; in the other a small placenta fragment was removed.

In 12 patients not included in this series, this drug was given before the separation was completed and a powerful contraction of the cervix caused an incarceration of the after-birth. In 1, two hours elapsed before the contraction relaxed, although bleeding was not excessive.

The author's experience would suggest that the administration of methergine should be delayed until separation is complete, or at least in progress.

DANIEL G. MORTON, M.D.

NEWBORN

Erickson, C. A.: Rubella Early in Pregnancy Causing Congenital Malformations of the Eyes and Heart. *J. Pediat.*, S. Louis, 1944, 25: 281.

Three series of cases were reported from Australia, in which virus infections, particularly rubella, occurring in early pregnancy seemed to be related to congenital defects. The author reviews these and reports an additional 11 cases.

The duration of pregnancy at the onset of the rubella varied from two to ten weeks. Cataracts, microphthalmia, or corneal opacity was present in all 11 babies.

Most of the babies were small and experienced feeding difficulties. Congenital heart defects were present in 9 of them. Two were considered mentally retarded and 1 had a severe anemia resembling erythroblastosis.

Important developmental changes occur in early pregnancy, which coincided with the occurrence of rubella. Increased observation may incriminate other virus infections as the cause of congenital anomalies.

The author states that, in view of the constant occurrence of serious congenital anomalies in association with rubella in early pregnancy, we should seriously consider: (1) deliberate exposure at an opportune time in childhood; (2) the use of convalescent serum on susceptible pregnant women, particularly if they have been exposed; (3) therapeutic abortion if rubella occurs during the first two months of pregnancy; and (4) research on animals with other types of virus infection.

JAMES F. DONNELLY, M.D.

Evans, M. W.: Congenital Dental Defects in Infants Subsequent to Maternal Rubella during Pregnancy. *Med. J. Australia,* 1944, 2: 225.

Maternal rubella occurring in early pregnancy is associated with a high frequency of congenital anomalies among which dental defects have been noted. Dental examinations were conducted on infants born of mothers having had rubella in early pregnancy.

Of the 34 babies examined 23 showed congenital dental anomalies, major in nature in 18 cases. All but 2 had other congenital defects. The most severe defects were present when the maternal infection occurred between the sixth and ninth week of pregnancy, which is considered to be the "critical" period of dental development. The main abnormalities noted were retardation of eruption, enamel hypoplasia, and dental caries.

JAMES F. DONNELLY, M.D.

Swan, C.: A Study of 3 Infants Dying From Congenital Defects Following Maternal Rubella in the Early Stages of Pregnancy. *J. Path. Bact.,* Lond., 1944, 56: 289.

Gregg first recorded the fact that mothers who contracted rubella in early pregnancy gave birth to infants suffering from congenital cataract often associated with congenital heart disease.

This report presents the observations made during autopsy on 3 of these infants.

All were small, thin, and undernourished. The anterior fontanelle was larger than normal in 2.

Ocular abnormalities were noted in 2 infants. Unilateral microphthalmia was present in one infant, the other eye being cataractous; the other infant had bilateral cataracts. Microscopically, the nuclear portion of the lens showed massive necrosis. There was disintegration of the cortical lens fibers which had been replaced by vacuoles. The fibers still living showed swelling, irregular staining, and granularity and vacuolation of the cytoplasm. The lens fibers were swollen and pale. Very little reparative effect was seen.

A variable enlargement of the heart was found. The ductus arteriosus was widely patent in all 3 cases, as was the foramen ovale. In 1 there was, in addition, a defect of the interventricular septum. Microscopically, the ductus arteriosus was noted to have a larger lumen and thinner wall than in the controls. The internal elastic lamina was either ill-defined or absent.

Atelectasis and bronchopneumonia were present in the lungs of all 3 cases. Minute foci of degeneration and necrosis were found in 2.

In the kidney occasional glomeruli were small and showed partial or complete replacement of their capillaries by hyalinized fibrous tissue. Some proliferation of the parietal layer of Bowman's capsule was seen but it differed from the crescentic type of glomerulonephritis.

No lesions were noted in other viscera.

Considerable evidence seems to indict the virus of rubella as the cause of these congenital abnormalities. The mechanism is not clear but it appears that the virus affects the blood vessels primarily.

JAMES F. DONNELLY, M.D.

MISCELLANEOUS

Grossmann, L. L.: The Diagnostic and Therapeutic Use of Prostigmine: Its Effect upon Pregnancy or Delayed Menstruation. *West. J. Surg.,* 1944, 52: 443.

The rationale and use of prostigmine in diagnosing pregnancy and/or treating delayed menstruation are described.

The drug was employed in diagnosing accurately or in treating effectively 100 cases of delayed menstruation due to pregnancy or some other cause. Patients were injected with 1 cc. of prostigmine methylsulfate (1:2,000) on three successive days unless bleeding ensued after the first or second injection. In 46 instances when bleeding did not result, pregnancy was correctly assumed to be present. In 4 of these 46 cases the Aschheim-Zondek test was negative at the time of the injections; these patients were later proved to be pregnant. In no case did bleeding occur in the presence of pregnancy, so far as could be determined clinically.

The test is inexpensive, simple to apply, and does not require laboratory assistance for verification. Apparently, uterine bleeding will almost invariably result in cases of amenorrhea not due to pregnancy, endocrine deficiencies, the menopause (2 cases), or gross pelvic disease. The onset of bleeding is due presumably to the production of uterine hyperemia by the drug.

DANIEL G. MORTON, M.D.

Prescott, F., and Basaen, M.: Inhibition of Lactation by Hexestrol Dipropionate. *Brit. M. J.,* 1944, 2: 428.

The authors briefly discuss the physiology of lactation and describe the rationale for using estrogens for the inhibition of lactation. Estrogens probably depress the activity of the anterior lobe of the pituitary gland. The absence of suckling plus estrogen administration produces the most satisfactory inhibition of lactation.

A review of the various methods currently used for inhibiting lactation, and their results, includes such substances as stilbestrol, hexestrol, dienoestrol, trichlorethylene, testosterone propionate, and methyl testosterone. These substances are usually given by mouth over periods varying from three to ten days.

The authors point out that esterification of the estrogens retards their rate of absorption and elimination and thus prolongs their action in the body. Hexoestrol dipropionate was found to be not as effective by mouth, but the duration of action was twice as long. It was therefore decided to try its effect in the suppression of lactation.

Two groups of patients were used; 23 were given hexoestrol dipropionate by mouth, and 44 were given this substance in oil intramuscularly. All patients treated were those in whom it was necessary to inhi-

bit lactation because of stillbirth, abortion, neonatal death, or cracked nipples. The oral dose of hexestrol dipropionate used was between 10 and 20 mgm. three times daily for three days. The dose by injection was 12.5 mgm. in one injection within the first three days after delivery.

The results of these treatments revealed that a single intramuscular injection of 12.5 mgm. of hexestrol dipropionate inhibited lactation in 66 per cent of the 44 mothers within the first three days of delivery. Lactation did not occur and there were no signs of breast engorgement or discomfort. In the remaining 34 per cent repeated injections brought relief to all but 2 per cent; 18 per cent required treatment for more than three days after delivery.

A further course of injections was necessary to suppress "secondary filling" in only 7 per cent of the cases. This compares well with percentages ranging from 25 to 45 for stilbestrol as reported in the reviewed literature.

Hexoestrol dipropionate given by mouth was not so satisfactory as when given by injection.

HARRY FIELDS, M.D.

Argenti, P.: Childbirth in the Greek Island of Chios in the Sixth Century B.C. *J. Obst. Gyn. Brit. Empire*, 1944, 51: 344.

Two Greek terracottas, small votive offerings, are in the Museum at Nicosia in Cyprus. The one represents a woman being delivered of child in an upright seated position; she is held from the back by another woman, who has her hands clasped round her belly and who is probably pressing the infant downwards exactly as described in "The Expert Midwife," of 1637, and in Sonnini's description written in 1780; in front, and facing her in a kneeling posture, is the midwife with her arms outstretched to receive the after-birth. The second terracotta is more coarsely modeled, and may be older; it represents a similar scene except that the seat on which the pregnant woman is reclining is missing, and from the angle of the thigh it would appear to have been higher; also there is no trace of a third woman supporting from the back the woman in labor.

These terracottas establish the fact that in classical times women were delivered in an upright perpendicular position, also that then in all probability some kind of special labor-stool was in use.

From what Sonnini writes, we may definitely deduce that at the close of the eighteenth century the labor-chair was no longer in use in France. The labor-chair, which was in use in Chios until about 1914, was higher than the tripod represented by Sonnini, and had a back in accordance with the ideas expressed in "The Expert Midwife," but instead of being concave to fit the curvature of the body, it is straight like an ordinary chair.

In Chios, doctors took over, so to speak, from midwives as late as about 1914. The following information was given by an old woman who had practiced midwifery on the island for many years before her retirement:

As there were no means of communication in Chios, except a few inferior roads, the midwife went on her round on muleback, generally accompanied by an assistant, who for choice would be her daughter and successor-elect to her practice; on one side of the mule was strapped the labor-chair, which folded up, having heavy hinges behind the seat and at the junctures of the arms and back. For padding, shaped cushions were tied to the different parts of the chair. The pregnant woman was seated in the chair and, in order to bring on the child, was jolted up and down from the back by the assistant, who held her under the arms; if the woman was heavy, the jolting was carried out by one of the women members of the family who helped by holding the woman under the left arm with her right hand and the midwife's assistant doing likewise on the right side with her left hand, thus leaving the right arm of the more experienced assistant free for pressing down the belly of the expectant mother. The midwife's position was exactly similar to that of the one represented in the terracottas dating from 600 B.C. The midwife's after-treatment continued for eight days, after which the mother was considered to be in condition to resume her normal life.

CHARLES BARON, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Zide, H. A.: Renal Complications of Sulfonamide Administration: Report of Reactions from Sulfathiazole and Sulfadiazine. *J. Urol.*, Balt., 1944, 52: 275.

The case histories of 10 patients with 11 renal reactions to sulfonamides, 1 to sulfathiazole and 10 to sulfadiazine, are analyzed.

The minimum dosage before renal symptoms occurred was 7 gm. of sodium sulfadiazine given intravenously.

The minimum time before onset of the renal symptoms was twenty-four hours.

Two delayed reactions occurred, one six days and the other twelve days after sulfadiazine was discontinued.

The urinary reaction to litmus paper during the renal complications was acid in 8 instances and undetermined in 2, and alkaline in 1 instance.

The blood sulfadiazine level ranged from 23 mgm. per cent to 4 mgm. per cent at or about the time of reaction, being over 8 mgm. per cent in most cases.

The treatment of this series of cases consisted of conservative means in all, with an unsuccessful attempt at manipulative treatment in 1 case which later responded to conservative treatment.

The end-results were cures of the original conditions and renal complications in all cases.

The prophylaxis and treatment of renal complications of sulfonamide administration are discussed.

JOHN A. LOEF, M.D.

Baretz, L. H.: Renal Hydrocele; Subscapsular Renal Extravasation. *J. Urol.*, Balt., 1944, 52: 184.

In a renal hydrocele the true capsule of the kidney is separated by urine so that the kidney is situated at the base of the sac. The etiology is dependent upon renal trauma and the following associated factors: (1) trauma or perforation which opens the pelvis or calyx; (2) a maintenance of the opening beyond the healing period; (3) an acquired or preexisting hydronephrosis; and (4) slow extravasation beneath a normal, uninjured capsule.

Gross pathology shows the capsule of the renal hydrocele to be composed of Gerota's fascia, perinephric fat and fascia, and renal capsule, all compressed and thickened into a shining membrane. On microscopic examination the inner surface shows a single layer of flat, or cuboidal cells on a loose, fibrous connective tissue. The deeper portions of the membrane show elastic fibers and lobules of adipose tissue separated by connective-tissue septa containing engorged capillaries. The sac is of variable proportion and the kidney surface is often characterized by multiple cortical abscesses with areas of coagulation necrosis and involvement of the tubules, with eventual autonephrectomy.

The author reports 8 cases from the American literature, all of which demonstrated a urinary extravasation beneath the true renal capsule. It is mentioned that other cases reviewed both from the American and foreign literature did not demonstrate that the sac lining was composed of true renal capsule.

The patient initially presents abdominal discomfort associated with an ever increasing abdominal tumor. The subjective findings of nausea, vomiting, and pain appear later, along with findings of toxicity and a low-grade temperature, in addition to an elevated total white-blood-cell count, secondary anemia, drowsiness, and marked weakness. The urine findings are limited to possibly a few white cells and, seldom, hematuria.

Cystoscopic examination may reveal no drainage of urine from the affected side, and pyelography may be vague because of the mass in the area, which in turn causes ureteral displacement or compression, or both. Furthermore, barium in the stomach discloses a roentgen outline of that organ which is forced laterally and anteriorly. The diagnosis of renal hydrocele is established at operation, but with a history of trauma and the discovery of a displaced and compressed ureter the diagnosis of renal hydrocele should be suggested.

The case of a patient thirty-seven years of age, who was found to have a left renal hydrocele after child delivery is reported. The sac was drained and nephrectomy avoided. This patient was treated by aspiration of the urine and the maintenance of free drainage through the operative incision. On the forty-fourth postoperative day, no further evidence of urinary drainage was evident from the loin wound; the patient was discharged from the hospital on her forty-sixth postoperative day. An intravenous pyelogram a month later revealed normal calyceal and pelvic morphology. The case is well illustrated by pyelographic reproductions, and stomach displacement is clearly demonstrated in another reproduction.

In the treatment of renal hydrocele, early operation is imperative. In the absence of extreme toxemia a repair of the calyceal fistula may be feasible. However, in extreme toxemia, drainage of the cyst should be performed, followed by nephrectomy at a later date. If the suppurative process subsides, subsequent nephrectomy may be avoided, as it was in the case reported by the author.

ROBERT LICH, JR., M.D.

Semans, J. H.: Nephrectomy for Hypertension in a Two-and-One-Half-Year-Old Child with Apparent Cure for Three Years. *Bull. Johns Hopkins Hosp.*, 1944, 75: 184.

Some difficulty remains in selecting those patients with hypertension who can be permanently relieved

by nephrectomy. The solution of this problem will be aided by reports of cases carefully studied before and after operation. In the case described, the blood pressure changed from a maximum preoperative level of 200/134 to one of 98/62 at the time of the last visit, three years after operation. The microscopic diagnosis of the lesion in the extirpated kidney was chronic pyelonephritis. However, marked perirenal fibrosis, a cause of experimentally produced hypertension in dogs, seemed the most important etiological factor in this case. A retroperitoneal teratoma had been removed four months previously from the region of the kidney. Symptoms began following this operation.

The decision to explore the left kidney was based on several considerations. On three occasions intravenous injections of diodrast outlined only the right upper urinary tract. Failure to demonstrate secretion of radiopaque material with x-rays in any one instance is not pathognomonic of renal disease, but when one of two kidneys is persistently unable to secrete the material in sufficient concentration to cast a shadow, it signifies little or no function on the blank side. Also in this case, the left kidney secreted less phenolsulfonphthalein than the right.

At operation there was a large amount of dense scar tissue around the kidney. No constriction of either the renal artery or its extrarenal branches was evident. However, in view of the poor prognosis, and of the findings suggesting renal disease on the left side, nephrectomy was carried out. The elimination of hypertension in this patient for a period of three years shows the relationship between the hypertension and the lesion in the left kidney.

While there was intimal thickening of some of the intrarenal arterioles, it seems probable that the perirenal fibrosis may have been a factor in producing this patient's hypertension and that previous removal of the teratoma from the retroperitoneal space resulted in the development of this fibrosis.

JOHN A. LOEF, M.D.

Scott, W. W.: Supernumerary Ureter with Extravesical Orifice. *J. Urol.*, Balt., 1944, 52: 126.

Four cases of supernumerary ureter with extravesical orifice are reported; all occurred in females. These cases bring the total recorded in the literature to more than 300, and according to Thom the actual incidence in the female is twice that in the male, although the apparent incidence is much less since the condition is asymptomatic because the ureter empties into the prostatic urethra, seminal vesicle, vas deferens, or ejaculatory duct.

The embryological explanation for aberrant ureteral insertion in the male is not disputed, but in the female, when the ureteral orifice is vaginal, there is disagreement since the vagina is of mullerian-duct derivation. However, Winterton's work is mentioned; this assumes an initial ureteral insertion with vaginal ectopia in the event of a break through the wall separating the wolffian and mullerian systems. Furthermore, it is reiterated that the most cephalad pelvis is always drained by the ureter having the more caudad insertion.

Regular, normal micturition despite incontinence in the female characterizes the condition. The incontinence, though both diurnal and nocturnal, may be either, or it may be intermittent. Mulholland collected 9 cases without incontinence.

The history of normal regular micturition and continuous incontinence permits a presumptive diagnosis of extravesical ureter. The diagnosis is confirmed by intravenous and retrograde pyelography.

The finding of a large kidney with the upper portion showing no collecting system strongly suggests duplication. Therefore, these findings and a single ureteral opening on the side, together with the characteristic history of incontinence in a female, supply sufficient evidence to warrant surgical exploration of the abnormal kidney.

The authors advise heminephrectomy with partial ureterectomy in the treatment of supernumerary ureter and extravesical orifice. The following résumé of the 4 cases is presented.

Case 1. A girl was first seen at the age of five years for a then diagnosed "chronic pyelitis," and two years later, by retrograde pyelography, was found to have a supernumerary ureter with an extravesical orifice. A heminephrectomy and partial ureterectomy were done and the patient has enjoyed good health during the nine years postoperatively.

Case. 2. A twenty-one-year-old female was subjected to a right heminephrectomy following the diagnosis of supernumerary ureter with an extravesical orifice which was located in the region of Skene's duct on the right. The postoperative course has been uneventful.

Case 3. A twenty-three-year-old female with urine seepage from birth demonstrated, by means of intravenous pyelography, "a collecting system in the superior segment of the large left kidney shadow," and on this finding the diagnosis of supernumerary ureter with an extravesical orifice was made. The left heminephrectomy showed little dilatation of the supernumerary segment, which explained the adequate dye concentration in the intravenous urograms.

Case 4. A girl of fourteen years showed no evident extravesical ureteral orifice, but pyelography showed on the left side a large renal shadow with no collecting system for its upper portion. On this finding a left renal exploration was done and a double kidney and ureter were found; the upper ureter and pelvis were dilated. A heminephrectomy was done.

ROBERT LICH, JR., M.D.

Goldstein, A. E., and Berman, E. F.: Ureterocutaneous Transplantation. A New Procedure. *J. Urol.*, Balt., 1944, 52: 224.

Although ureterointestinal anastomosis is a very satisfactory method of diversion of the urinary stream, ureterocutaneous transplantation is indicated in a considerable proportion of the cases requiring diversion of the urine. The conventional

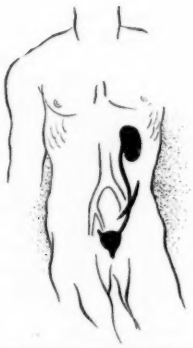


Fig. 1. Gibson incision.

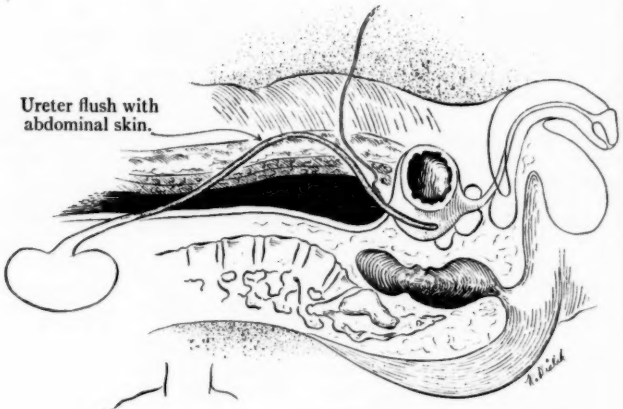


Fig. 2. Ureter in new position but still attached to bladder.

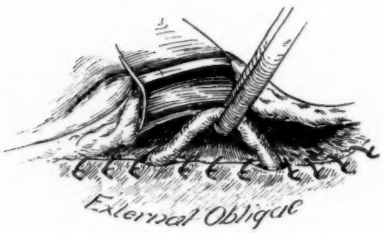


Fig. 3. Loop of ureter exposed. Internal oblique muscle buried.

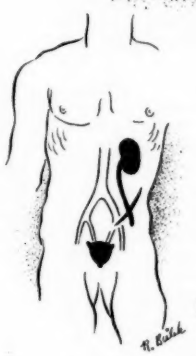


Fig. 4. Anatomical relationship.

operation of ureterocutaneous transplantation has had several disadvantages; namely, periureteral infection with abscess and slough of the ureter, retraction of the ureteral stump, stricture or kinking of the ureter, and insufficient length of the ureteral stump to permit of a properly adjusted apparatus.

A new technique of ureterocutaneous transplantation, the fundamental principle of which is the establishment of the "right of domicile" of the ureter on the anterior abdominal wall, is described. At the first stage of the operation the ureter is approached through a Gibson incision extraperitoneally, and is bluntly dissected free down to the bladder. A loop of silk is passed around the ureter and the ends are led out to the skin to assist in locating the ureter at its junction with the bladder at the second stage. The internal and external oblique muscles and fascia are united behind the ureter, which makes it a subcutaneous structure. No sutures are placed in the ureter and the ureter is not opened at the first operation. It is desirable but not always possible to introduce an indwelling ureteral catheter through the cystoscope preoperatively in order to provide drainage and prevent kinking of the ureter during the three to seven days between the two stages. During this interval the ureter is stretched somewhat and new sources of blood supply are obtained. Leaving the apex of the ureter in the subcutaneous tissues also provides for observation of its blood supply at frequent intervals.

At the second stage the distal end of the ureter is ligated and phenolized and the proximal portion is brought out as a 3 to 5 cm. ureteral stump. A urethral or Foley catheter is inserted into the pelvis of the kidney to provide drainage. Cystectomy may be performed at the second stage of the operation. The authors consider the use of a cupping device theoretically more suitable than an indwelling catheter, but they have been temporarily unable to obtain satisfactory appliances.

Three cases are reported in which this method has been employed. Two were carcinomas of the bladder (1 following nephrectomy for carcinoma of the renal pelvis), and one was severe encrusted cystitis with congenital absence of one kidney. In all of these cases the urinary output was considerably reduced during the first three days following the first stage of the operation, which indicated that the ureter was partially obstructed. In 1 case the output was only 100 cc. per day for the first three days and in another case there was no output for sixty-six hours and the blood urea was 120 mgm. per cent.

The resultant ureteral stumps in these 3 cases certainly warrant the added time required to prepare them. The retrograde pyelograms show that the course of the ureter is direct and free from angula-

tions. Thus far the procedure has not been performed bilaterally, but the authors believe that should the indication arise, it might be done with equal success. DONALD F. MCDONALD, M.D.

BLADDER, URETHRA, AND PENIS

Ross, J. C.: Injuries of the Urinary Bladder. *Brit. J. Surg.*, 1944, 32: 44.

The communication opens with the statement that a dark shadow still hovers over the subject of injured bladder, and although the condition is not common in civilian emergency surgery, it occurs in modern warfare. In civilian life bladder injuries are primarily due to automobile accidents and are almost always associated with fracture of the pelvis.

Bladder injuries are divided into three types: (1) contusions, such as occur in long labor, (2) wounds, such as occur in penetrating wounds and vaginal hysterectomy, and (3) rupture, such as occurs after a blow to the hypogastrium in inebriates and after overdistention during cystoscopy.

Clinically, the injuries are divided into the intraperitoneal and extraperitoneal types, the former usually caused by abdominal trauma and the latter usually the result of pelvic trauma. Intraperitoneal injuries usually affect the dome and posterior wall of the bladder with resulting peritonitis; extraperitoneal injuries are usually located anteriorly, laterally, or at the base of the bladder and cause extravasation with resulting pelvic cellulitis. The author confirmed these findings by work upon the cadaver.

The prognosis has been found to be in direct relation to the time interval between rupture and repair. Hamilton Bailey is quoted as having an 11 per cent mortality if operation is performed within twelve hours of injury, 55 per cent if operation is delayed for twenty-four hours, and 100 per cent if no operation is performed.

The diagnosis of ruptured bladder may be made on the basis of the history, degree of shock, inability to void, degree of stranguria, plain x-ray film and intravenous urogram, if facilities are available, and the presence of blood when a urethral catheter is passed. The author believes that cystoscopy is permissible if it is considered justifiable to insert a urethral catheter and inject sterile saline solution. He condemns the use of 2 per cent sodium iodide for cystograms and of air for pneumocystograms.

The author advocates exploration and repair of all abdominal viscera, excision and suturing of the bladder wound, and closure of the peritoneal cavity with or without drainage in cases of intraperitoneal rupture. Suprapubic drainage of the bladder is mandatory. Extraperitoneal injuries should likewise have suprapubic exploration with suprapubic drainage of the bladder. Sulfonamide preparations should be used as indicated.

Four illustrative cases with subsequent complete recovery are presented. The article is supported with an ample bibliography.

CHARLES C. HIGGINS, M.D.

MISCELLANEOUS

McCahey, J. F., and Fetter, J. S.: Nonfibrous Vesicoureteral Obstruction. *J. Urol.*, Balt., 1944, 52: 216.

The authors' purpose in presenting this article is to demonstrate that vesicoureteral obstruction may exist without an organized stricture. Their view is not shared by current urologic opinion which assumes that if there is no hindrance to the passage of a ureteral catheter upward there is no hindrance to the flow of urine downward.

Five cases are presented in which pyelography demonstrated some degree of dilatation of the renal pelvis or ureter, or both. In 4 of the cases the presenting symptom was renal colic; in the fifth case hematuria was the complaint. One case of renal colic following retrograde pyelography showed dilatation of the pelves and ureters but no stricture of the ureter could be demonstrated. Two days later the intravenous pyelograms were normal. One case was treated by ureteral meatotomy and periodic dilatations with good end-results. Another case of unilateral renal colic unassociated with demonstrable stricture of the ureter showed dilatation of the pelvis and ureter on the intravenous pyelogram. Catheterization of the ureters relieved the pain, and two days later the pyelograms were normal. On the intravenous pyelograms of a male with a two-month history of intermittent attacks of pain in the right loin a narrowing of the ureter at its junction with the pelvis was demonstrated. Retrograde pyelograms showed that there was no stricture in this region but periodic dilatations of the ureter resulted in relief of the painful attacks. The case in which hematuria was the presenting complaint showed bilateral hydronephrosis and hydroureter. Ureteral dilatation resulted in cessation of the hematuria.

The authors conclude on the basis of these studies that the fact that ureteral catheterization offers no difficulty is not proof that obstruction does not exist at the vesical end of the ureter. Nonfibrous vesicoureteral obstruction should be considered whenever suspicion of obstruction is justified by urologic findings. Continued dilatations may be necessary in some instances of vesicoureteral obstruction. Proper management may be not only pain-relieving but life-prolonging. DONALD F. MCDONALD, M.D.

Whitehill, R., and Miller, M. H.: Infestation of the Genitourinary Tract by Strongyloides Stercoralis: a Case Report. *Bull. Johns Hopkins Hosp.*, 1944, 75: 169.

Strongyloides stercoralis is a human parasite whose usual habitat is the small intestine. The authors recently encountered a patient in whom larvae of this worm were present in the urine. Because of the extreme rarity of this finding they thought it worth while to report the case.

A twenty-two-year-old, white, single sailor was admitted to a South Pacific base hospital on April 17, 1944 because of frequency, nocturia, and ur-

gency. As long as he could recall he had diurnal frequency up to 10 times. He had nocturnal enuresis until the age of sixteen. After the enuresis cleared he had nocturia 2 times every night. Also for as long as he knew he had some urgency, most marked early in the morning. For two months the urgency was more severe and there was occasional incontinence in the early morning. Five days before the admission a routine urinalysis performed in the base hospital showed a rhabditiform larva of strongyloides stercoralis in the centrifuged sediment. Urinary sediments were examined daily during the period of hospitalization. Over the first ten days rhabditiform larvae of strongyloides stercoralis were observed on 4 occasions. Occasional urines also showed a trace of albumin, a few white cells, and granular casts. Urine cultures were sterile. Numerous stools were negative for strongyloides but contained ova of trichuris trichiura. The external genitalia and prostate gland were normal. The prostatic fluid was normal. The urethra was normal. There was a small slightly trabeculated area on the posterior bladder wall and a few small areas of infection in the mucosa. The trigone was slightly infected. The vesical orifice was slightly irregular with a small polyplike projection at 2 o'clock. Both ureters were patent without obstruction to a #6 whistle-tip catheter with a small bulb. Retrograde pyelograms were normal.

Treatment of the strongyloides infestation consisted of enteric-coated capsules of gentian violet (0.06 gm.) given by mouth after each meal from April 28 to May 12, 1944. After a week of this medication the symptoms of nocturia, urgency, and incontinence cleared. Diurnal urinary frequency decreased to 6 times. The strongyloides also disappeared from the urine which was examined daily.

JOHN A. LOEF, M.D.

Thompson, G. J.: The Clinical Use of Penicillin in Genitourinary Infections. *J. Am. M. Ass.*, 1944, 126: 403.

Five hundred cases in which a diagnosis was made of gonococcal infection of the urethra or its adnexa and 100 cases in which the patient suffered from various nonspecific infections of the genitourinary tract were treated by various methods of administration and various dosages of penicillin. Apparently effective and most convenient in most cases was the intramuscular injection of 20,000 units every three hours for five doses. In the gonorrheal conditions, failures were reduced to 2 per cent with this method, and even these so-called failures were, in uncomplicated gonorrheal infection, cured by subsequent courses of penicillin injection. In no case did the infecting organism prove to be penicillin-resistant, and in no case was there local reaction of systemic reaction even after large doses (500,000 units), which suggested that even larger doses might be employed. In the 10 complicated gonorrheal conditions (epididymitis, prostatitis, seminal vesiculitis) adequate penicillin medication resulted in dramatic improvement as a rule; even in the 6 patients with gonorrheal arthritis the concurrent gonorrheal infection in the urethra and prostate quickly subsided, although the joint condition was not obviously influenced.

Results in the nonspecific genitourinary infections were satisfactory in 4 patients with acute prostatitis (1 with accompanying keratitis), 6 cases of balanites, 3 infected wound infections, in 24 of 30 patients with chronic prostatitis, in 33 of 36 with urethritis, in 7 of 8 with acute epididymitis, and in 8 of 10 with pyelonephritis. In the 3 instances of interstitial cystitis there was no improvement ascribable to the penicillin treatment. In general, improvement was not so dramatic or so rapid as in the gonorrheal infections, and medication seemed more effective against the Gram-positive organisms; nevertheless, penicillin combined with other urinary antiseptics might well be superior to other forms of treatment.

JOHN W. BRENNAN, M.D.

Nelson, R. A.: Penicillin in the Treatment of Granuloma Inguinale. *Am. J. Syph.*, 1944, 28: 611.

Encouraged by reports of Mahoney on the treatment of early syphilis with penicillin, 2 negro males, thirty-three and forty-three years of age, respectively, both apparently with chronic syphilis of long standing, and both suffering with chronic granuloma inguinale (by Donovan bodies on biopsy) were treated with large amounts of penicillin. One was given 2,800,000 units intramuscularly in fifteen days, and the other 1,360,000 units in four and a half days.

After cessation of the treatment these patients were under observation for from thirty to forty days, and during this time no significant change was observed in the lesions—bilateral inguinal ulcers, and prepucial ulcer in both patients. Donovan bodies were still present in the tissues of the first patient at biopsy, twenty-seven days after therapy was begun.

JOHN W. BRENNAN, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Reifenstein, E. C., Jr., and Albright, F.: Paget's Disease: Its Pathological Physiology and the Importance of This in the Complications Arising from Fracture and Immobilization. *N. England J. M.*, 1944, 231: 343.

Attention is called to the occurrence of acute atrophy of bone (osteoporosis) as a complication of Paget's disease, and the seriousness and implications of the situation as illustrated by 2 detailed case histories are discussed. Discussed briefly are: normal bone metabolism, the metabolic abnormalities in osteoporosis as opposed to those in osteomalacia and osteitis fibrosa generalisata, the morbid anatomy of Paget's disease, and, finally, a concept concerning the pathological physiology in Paget's disease.

The fact that bone lesions of Paget's disease are not generalized, but spotty in their distribution, is strong evidence against the disturbance being on an endocrinological or metabolic basis. The initial lesion is bone destruction, the cause of which is obscure. The resultant weakness of the involved bones renders them less resistant to stresses and strains, and this leads to a stimulation of the osteoblasts and an overproduction of bone. The repair of bone by the osteoblasts is never completed, since the localized initial disorder causing bone destruction apparently persists. There results alternating destruction and repair of bone, which eventually leads to the pathognomonic pathological finding, the so-called "mosaic structure." In osteitis fibrosa generalisata bone is destroyed that can best be spared, while in Paget's disease bone is destroyed without regard to structure.

If a bone containing Paget's disease is immobilized, as after a fracture, the following events occur: the lack of stress and strain, in all probability abetted by the alarm reaction of Selye, curbs the overactivity of the osteoblasts, and the serum phosphatase level, an index of bone formation, falls. The initial disturbance causing bone destruction persists. There results a marked imbalance between bone destruction and bone formation. The increased calcium and phosphorus coming from the bone leads to hypercalciuria and hyperphosphaturia. The capacity of the kidney to excrete calcium may be overtaxed with a resulting hypercalcemia, and if fluids are not forced, the diet is not kept low in calcium, and immobilization is not kept at a minimum, a so-called "chemical death" from hypercalcemia may supervene. Although, in Paget's disease, the broken bone becomes decalcified as a whole, the fracture site shows a rapidly forming and calcifying callus. This is best explained by the hypothesis that some local influence which stimulates the osteoblasts is set loose at the site of the fracture.

EMIL C. ROBITSHEK, M.D.

FRACTURES AND DISLOCATIONS

Blount, W. P., Schaefer, A. A., and Fox, G. W.: Fractures of the Femur in Children. *South. M. J.*, 1944, 37: 481.

An attempt is made to correlate the findings in the literature with those in an eight-year end-result study of 280 cases of fracture of the femur conducted at the Milwaukee Children's Hospital. Of 281 fractures, 50 were in the upper third of the femur, 194 in the middle third, and 37 in the lower third. Of the 194 fractures of the middle third, 93 were transverse, 99 oblique, and 2 greenstick fractures. Comminuted fractures are much rarer in children than in adults. Transverse fractures are likely to be associated with direct trauma, while the long spiral ones are more frequently the result of indirect trauma. Greenstick fractures are less common in the middle third than in the lower third.

Traction is used routinely in the treatment of fractures of the femur. In children up to the ages of four and five, the overhead traction of Bryant is recommended. The Russell traction method is their choice of treatment for older children, to be used for an average period of from four to six weeks. The patient should be kept in bed for a week or more after the removal of the traction, but physical therapy and the routine use of the Thomas walking caliper or cast application following traction are unnecessary. In occasional cases of skeletal traction a Kirschner wire passed through the tibia is recommended. The need for open reduction exists only in fracture at the epiphysis. Follow-up of the patient for a year or more after the fracture has healed, is an important part of the treatment. Shortening and overgrowth are of considerable practical importance. Either one may be well corrected by arrest of growth of the distal femoral epiphysis of the longer femur at an appropriate age. The surgeon's duty is not fulfilled to his patient until the child has been discharged with legs of equal length several years after the date of the fracture or after closure of the epiphyseal lines.

Fractures of the lower third of the femur were found to be ideally treated by the Russell method. Epiphyseal displacements are apt to be associated with serious local circulatory disturbances and should be treated as surgical emergencies.

Fractures of the upper third of the femur are treated essentially the same as those of the middle third, with important exceptions. Failures are frequently due to the way the method is applied rather than to any fault of the method itself.

Fractures through the epiphyseal lines at either end are difficult to treat and fraught with grave danger of complications. In the authors' series there were only 3 fractures of the neck and trochanter. In greenstick fractures of the trochanter in small chil-

dren, the Bryant traction or plaster fixation in abduction is adequate. In older children with fractures of the neck of the femur, it is desirable to use the abduction traction cast of Hoke. In children of twelve or more, internal fixation is sometimes justified.

EMIL C. ROBITSHEK, M.D.

Tyner, F. H., and Hileman, W. T.: March Fracture; an Analysis of 166 Cases. *Am. J. Roentg.*, 1944, 52: 165.

The term "march fracture," as it is generally understood, applies to those fractures of the metatarsal bones which occur without great trauma, during a march. Due importance to the theory of small repeated traumas incurred in long marches has been given, but all authors agree that some other factor must be involved before march fracture occurs.

The authors studied 166 cases, securing accurate information as to the time that the fracture occurred after the beginning of the march, the foot involved, as well as which metatarsal. The blood chemistry was studied in 12 cases. Case reports are given in detail in 3 cases.

The most important factor in the production of these fractures is the increased stress on the metatarsal bones, induced by muscular fatigue.

EMIL C. ROBITSHIK, M.D.

Krause, G. R., and Thompson, J. R., Jr.: March Fracture; An Analysis of 200 Cases. *Am. J. Roentg.*, 1944, 52: 281.

The results of a study of 200 soldiers who sustained 220 march fractures of the metatarsals between May, 1941 and August, 1943 are presented. Special attention is given to possible predisposing factors, and the various theories which have been advanced to explain the pathogenesis of these fractures are discussed. The clinical findings and roentgenological appearances are described in detail. Forty-four per cent of the fractures were in the second metatarsal, 51 per cent in the third, and 5 per cent in the fourth. The great majority of the soldiers in this series of cases were infantry men. The length of service prior to the onset of symptoms varied from one month to seven years and ten months, but 80 per cent of the fractures occurred during the first six months of service. Eighty-one per cent of the patients were between eighteen and twenty-nine years of age. Many volunteered the information that the onset of the pain occurred toward the end of a long march.

The immediate cause of the fracture is the rhythmically repeated, subthreshold traumas incident to marching, which, acting by summation, reach a point beyond the ability of the bone to bear stress. Fatigue of the calf muscle causes these subthreshold injuries to be accentuated.

A control group of 400 cases was also studied. One half of the fractures are seen and can be diagnosed before callus formation occurs. The fractures vary in extent from a narrow "hair line" to actual comminution. Seven per cent could not be diagnosed on the first examination, but were apparent on reexamination in a few days. Careful study of technically perfect roentgenograms is a requisite. Conservative treatment restores these men to duty with a minimum of time lost. EMIL C. ROBITSHEK, M.D.

ORTHOPEDICS IN GENERAL

Frankel, C. J.: The Treatment of Acute and Subacute Anterior Poliomyelitis. *Virginia M. Month.*, 1944, 71: 451.

The author has used the Kenny method of treatment of anterior poliomyelitis at the University of Virginia Hospital for over a year, following Miss Kenny's tenets scrupulously. His conclusions were that the patients were made more comfortable by the applications of hot packs, and that the Kenny system of physical therapy had some merit. He could see no reason, however, for the system of rigid, almost ritual-like, rules laid down by Miss Kenny, nor were her explanations of various phenomena valid.

He found the Kenny treatment expensive. It required large numbers of trained personnel, few of whom are now available. In view of his indifferent results, he has discarded the full Kenny treatment and has returned to the so-called orthodox method; however, he utilizes a few of the routines advocated by Miss Kenny.

The patients are being placed on firm beds, supplemented by fracture and foot boards. This is the type of bed advocated by Sister Kenny and in his opinion provides excellent immobilization.

Muscle checks are made by trained physical therapists as well as by the orthopedic staff, and all painful muscle groups are treated with the hot wet packs.

The method of application, as suggested by Sister Kenny, carries with it practically no danger of skin burn and therefore is to be recommended over methods more easily applied. However, the author does not apply the packs more often than four or five times daily because personnel requirements rise sharply with more numerous applications than this. Prostigmine, methyl sulfate, and atropine are being administered subcutaneously for one dose and after that prostigmine bromide and atropine are given three times daily. Recent work has shown that these drugs play a definite part in relieving muscle spasm.

When muscle pain subsides physical therapy is instituted. Muscle checks are made about once every month and hot packs are discontinued with the disappearance of pain and limitation of motion.

As soon as is feasible, ambulatory braces are applied.

Cases which show no progress within a period of six months are generally considered hopeless so far as future recovery of the affected parts is concerned, and ambulatory braces should be applied. No surgery is contemplated for at least one year or eighteen months after the onset of the disease.

Precautions should be taken against exposure to flies. These insects are known to be able to carry

and distribute the virus, particularly when excreta from patients in the acute stage of the disease has not been disposed of properly.

An examination should be made of the extremities by practitioners to determine the sites for the hot packs. Both legs should be lifted carefully from the bed and if the patient complains of pain in the hamstring area, that site should be noted for application of the hot packs. The feet should be dorsiflexed to demonstrate pain in the calf group. Sitting the patient up and flexing the neck will demonstrate involvement of the neck muscles. Abduction of the arms will demonstrate pain or involvement in the pectoral or shoulder area, and movement of the elbow and wrist will bring out pain if present in those parts.

The author has found that the rigid bed is more simple and appears to be more satisfactory than splints or casts. There is, however, no valid objection to the use of these splints.

Other methods of heat have been tried; they include hot paraffin, diathermy, infrared, electric pads, hot-water bottles, and heat cradles, but none have as yet proved as efficacious as the hot woolen pack when well wrung out.

ROBERT P. MONTGOMERY, M.D.

Chance, B., Jr.: Evaluation of the Kenny Method in the Treatment of Chronic Infantile Paralysis. *Pennsylvania M. J.*, 1944, 47: 975.

The author evaluates 23 cases of chronic infantile paralysis treated according to the Kenny method. The patients selected had their disease from one to five years and had previously received the best of orthodox physical therapy. They were all carefully evaluated on the basis of their previous rate of improvement, and the majority had, in the author's opinion, reached a stage in which little or no further improvement could be expected with the usual type of physical therapy. All of the cases displayed the following symptoms: (1) muscle spasm, (2) incoordination, and (3) loss of tone, reflexes, and the ability of voluntary contraction, described under the Kenny concept as "mental alienation."

Two forms of treatment were carried out. The first was the application of hot fomentations for the relief of muscle spasm. These were made of wool-blanket material wrung out of boiling water and applied directly to the skin in packs for two-hour periods. The second phase of the treatment was that of muscle education. Individual muscle function was stressed and attempts were made to make the patient aware of the correct action of each muscle. Careful records were kept at all times. Limitation in joint motion was measured and photographed at frequent intervals. Increase in the range of joint motion was taken to be an indication of release of the muscle spasm. In all cases the previous treatment and the rate of improvement were well known and all of them were treated by the same technicians as previously.

After from three to eight months of this treatment the author noted a decrease in muscle spasm in all of the cases. Release of muscle contracture was noted in all but 7 cases. Seventeen of the cases showed marked improvement and all of the cases showed some over-all improvement. One factor noted in the improvement was the excellent psychological influence of the treatment. The author stresses that the Kenny treatment must be directed at the clinical manifestations of spasm and carried out only when indicated. Cases must be carefully selected if good results are to be obtained. Complete prolonged paralysis of antagonistic muscle groups associated with the destruction of anterior horn cells in the spinal cord cannot be helped either by the Kenny treatment or any other type of physical therapy now in use.

DAVID H. LEVINTHAL, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Elkin, D. C.: Vascular Injuries of Warfare. *Ann. Surg.*, 1944, 120: 284.

Vascular war injuries may be classified in three groups: the first consists of those cases in which the blood vessel is either completely severed or in such a state of vasospasm as to cause death of the tissues it supplies; the second consists of cases in which an already existing vascular lesion is activated by the trauma of military service; and the third consists of cases of arteriovenous fistula or aneurysm.

Arterial occlusion may be either partial or complete. With total occlusion, gangrene or ischemic paralysis will result unless an adequate collateral circulation is established. Arterial spasm results from trauma to the vessel wall itself or to the tissues about it. Vasospasm may be segmental or sufficiently reflex in character to produce a total vasomotor imbalance of an extremity. If this condition is not relieved, thrombosis with fibrosis, atrophy, and deformity, and even gangrene, will develop. Reflex vasoconstrictor impulses may be removed by periarterial sympathectomy, ganglionectomy, or procaine sympathetic block.

Pre-existing vascular lesions such as vascular nevi, congenital telangiectasis, or angiomas, may become cirsoid aneurysms, pulsating angiomas, and arteriovenous aneurysms when activated by trauma. Twelve cases with such histories are reported. These lesions may be treated in a variety of ways, i.e., ligation of the main blood supply, multiple circumferential sutures, or the injection of sclerotic agents.

Early in the inception of arteriovenous fistula, no symptoms or physical signs may be noted other than an auscultatory bruit. Other signs and symptoms may be masked until the edema or the hematoma of trauma subsides. An arteriovenous fistula can be differentiated from a false arterial aneurysm by detection of a continuous thrill and bruit accentuated

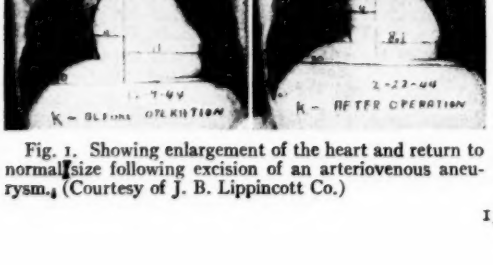


Fig. 1. Showing enlargement of the heart and return to normal size following excision of an arteriovenous aneurysm. (Courtesy of J. B. Lippincott Co.)

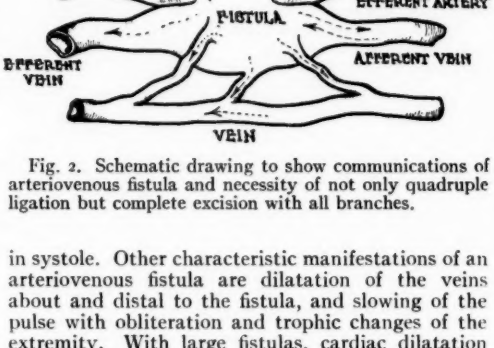


Fig. 2. Schematic drawing to show communications of arteriovenous fistula and necessity of not only quadruple ligation but complete excision with all branches.

in systole. Other characteristic manifestations of an arteriovenous fistula are dilatation of the veins about and distal to the fistula, and slowing of the pulse with obliteration and trophic changes of the extremity. With large fistulas, cardiac dilatation may be demonstrated with x-rays. Treatment should be deferred to allow for the maximal development of a collateral circulation unless cardiac failure is imminent. To be successful, operation requires that the fistula be completely excised or obliterated. Ligation alone is often followed by recurrence through the collateral circulation. When excision is not possible, the fistula may be infolded by heavy mattress sutures. The operation should be done without the use of a tourniquet.

In the discussion BECK stated that vasospasm may develop after nonpenetrating wounds, simple fractures of the long bones after severe wounds, and in the presence of various types of superficial infections, such as trichophytosis. Vasospasm may be the deciding factor in gangrene of a part and influence the development of gas infection. Sympathectomy should be done more commonly.

The Matas technique for the treatment of arteriovenous aneurysms was discussed and RIVES demonstrated the value of obliterative aneurysmorrhaphy by a series of case reports and claimed that it offered the best method of preservation of the collateral circulation and required a minimum of dissection.

WHIPPLE referred to the work of Blakemore and Lord who have devised a nonsuture method of bridging gaps in arteries with vein grafts on vitallium tubes which permits re-establishment of arterial continuity. BENJAMIN G. P. SHAFIROFF, M.D.

Bigger, I. A.: The Treatment of Traumatic Aneurysms and Arteriovenous Fistulas. *Arch. Surg.*, 1944, 49: 170.

Twenty-nine cases of traumatic arterial aneurysm or arteriovenous fistula have been studied by the

authors. Thirteen of the patients had arteriovenous fistulas, 15 had arterial aneurysms, and 1 had an aneurysm of the abdominal aorta and a fistula between the aorta and the vena cava.

A traumatic arterial aneurysm is usually the result of injury to an artery deeply embedded in the soft tissues. In the early state the lesion is called a pulsating hematoma, but when it becomes well localized and spherical it is called a traumatic or false aneurysm. This article is concerned with the latter condition.

It is generally agreed that once localization has occurred, surgical intervention should be delayed to permit improvement in the collateral circulation and disappearance of bacteria from the adjacent tissues. Unless complications which demand earlier operation arise, conservative treatment should be continued for at least from six to eight weeks.

The interruption of nerve function by the pressure of an expanding aneurysm is not necessarily an indication for excision of the aneurysmal sac, for any procedure which relieves pressure, such as aneurysmorrhaphy, if performed early, will be followed by return of nerve function. It is important, therefore, that a careful neurological examination be done on any patient with a traumatic vascular lesion, especially when the subclavian, axillary, brachial, or popliteal artery is involved.

Infection alone may be treated conservatively, but careful watch must be kept for secondary hemorrhage, and if it occurs immediate operation is indicated. The type of operation is dependent on the extent and severity of the infection as well as on the location of the aneurysm. If the infection is mild and, especially, if the aneurysm is so located that exposure of the artery proximal to the infection is difficult or fraught with unusual danger, the sac may be opened and the artery doubly ligated and completely divided between the ligatures. If, on the other hand, the artery can be readily exposed proximal to the area of infection and obstructed without interference with essential collateral channels, proximal ligation of the artery and of the concomitant vein may be the treatment of choice.

Excision of an aneurysmal sac is more certain to cure the lesion than aneurysmorrhaphy, but has the disadvantage of destroying more collateral channels than does the intrasaccular operation. It is reasonable to assume that interference with the collateral arteries would increase the danger of ischemic gangrene and would also increase the degree of chronic circulatory deficiency.

An atypical or incomplete operation may result in cure of a traumatic aneurysm, but an arteriovenous fistula is rarely cured except by complete ligation of the involved vessels and excision of the fistulous area or by suture of the artery. If the latter procedure is employed, it is usually better to ligate the vein above and below the fistula and then to open the vein and suture the artery under direct vision.

Evidence presented by the author indicates that although the excellent collateral circulation developed in the presence of an arteriovenous fistula makes the danger of ischemic gangrene almost negligible, it does not prevent persistent circulatory difficulty when main vessels are ligated and resected. It is therefore suggested that when such important vessels as the carotid artery and jugular vein, the common femoral vessels, or the popliteal vessels are the site of an arteriovenous fistula, transvenous repair of the artery be employed if there are no contraindications. The most important contraindication to arterial suture is calcification of the wall of the artery in the area to be sutured.

When main vessels are obstructed, especially those to the lower extremity, permanent interruption of the sympathetic nerves to that extremity may help prevent chronic circulatory deficiency distal to the obstruction. JOSEPH K. NARAT, M.D.

BLOOD; TRANSFUSION

Massie, E., Stillerman, H. S., Wright, C., and Minnich, V.: The Effect of the Administration of Digitalis on the Coagulability of Human Blood. *Arch. Int. M.*, 1944, 74: 172.

Oral therapeutic doses of digitalis caused the clotting time, determined by the Lee-White method, to be accelerated in each of 24 patients during the period of administration of the drug. The prothrombin time, measured, in about half of the cases, by the Smith bedside method, was not altered nor were changes observed in clot retraction. After the administration of digitalis was discontinued the coagulation time increased in the majority of the 13 patients so studied, even though the drug had not yet been completely excreted during the period of observation. It is suggested that digitaloid drugs may have a thromboplastic effect on the clotting mechanism. WALTER H. NADLER, M.D.

Crawford, T., and Nassim, J. R.: Unusual Response to Dicumarol Therapy. *Lancet*, Lond., 1944, 247: 404.

The synthetic antiprothrombic substance dicumarol is coming increasingly into use in cases of venous thrombosis and in other conditions in which it is desired to diminish the clotting power of the blood. The case reported shows some of the difficulties which may arise during the use of the drug. It also illustrates that dicumarol may take very much longer than the usual forty-eight hours to act and its effect may last days after dosage ceases.

A soldier, aged nineteen years, was admitted to the ophthalmic department of a military hospital complaining of flashes of light before his eyes and increasing blurring of vision during the last three months. There was nothing relevant in his previous health or family history.

He was a young man of excellent physique and in good general condition. His blood-pressure reading was 120/80 mm. Hg. Nothing abnormal was detected on physical examination with the exception of the eye findings. Vision in the right eye

was reduced to perception of hand movements only at 3 ft., while that in the left eye was 6/60. Bilateral thrombosis of the retinal veins was found.

In view of the fact that the thrombotic process was extending and vision deteriorating, it was decided to administer a course of dicumarol with the object of diminishing the clotting power of the blood, and in the hope of checking the progress of the disease. Treatment was begun on September 30, 1943, with a dose of 300 mgm. of dicumarol, and thereafter 200 mgm. were given each day after the prothrombin time had been determined. The prothrombin time increased disappointingly slowly, reaching only thirty seconds after thirteen days of treatment. Because of this slow response the dose of dicumarol was increased to 225 mgm. on the fourteenth day and to 300 mgm. on each of the three succeeding days. The drug was then discontinued because of the development of signs of intolerance. On the tenth day of treatment the patient complained of headache, nausea, and constipation. On the thirteenth day there was complaint of backache. On the seventeenth and last day of the dicumarol treatment he developed pain in the abdomen and back, and vomited several times.

When the dicumarol administration was stopped the prothrombin time had reached thirty-six seconds. Two days later it rose to thirty-nine seconds and gross hematuria began. Later this day a subconjunctival hemorrhage appeared in the right eye and a transfusion of a pint of fresh blood was then given. This reduced the prothrombin time to twenty-nine seconds but free hematuria continued. On the fourth day after cessation of the treatment the prothrombin time reached a peak figure of forty-seven seconds. Subconjunctival hemorrhage had now appeared in the left eye and had extended in the right. Hematuria was more profuse. A transfusion of 2 pints of fresh blood was given and the prothrombin time fell to twenty-five seconds. Two days later, however, it had again increased to thirty-five seconds and a third and final transfusion of 2 pints of fresh blood was given. Thereafter the prothrombin time fell to its original value of twenty-two seconds and remained at this level with only minor fluctuations. Gross hematuria continued for a further five days (eleven days in all) after which there was microscopic hematuria for six days before the urine became normal. All symptoms associated with the dicumarol gradually subsided. Six days after cessation of treatment the blood pressure had fallen from 160/100. The drug appeared to be without effect on the retinal venous thrombosis.

The points of interest arising from this case are: the delay in the development of the antiprothrombic action of dicumarol in a patient who later reacted strongly to the drug; the signs of gastric and renal irritation which preceded the hemorrhage; and the long period of action of the drug after its administration had been stopped.

It is evident that at present great caution must be exercised in increasing the dose of dicumarol when the response to ordinary dosage is unusually prolonged. In addition, it is clear that in using this drug the physician or surgeon must be prepared to administer repeated transfusions of fresh blood should hemorrhage occur; and a close watch must be kept on the prothrombin time for at least a week after administration of the drug has ceased. The action of dicumarol is in contrast to the more physiological action of heparin. JOHN E. KIRKPATRICK, M.D.

Scott, R. A. M., and Lissimore, N.: Mesenteric Thromboses in Lymphatic Leucemia Treated with Dicumarol. *Lancet*, Lond., 1944, 247: 405.

The authors report the case of an active man aged sixty-two years who had been healthy until at the age of forty-five he noticed shortness of breath on climbing, and increasing fatigue at the end of the day. Occasionally he had taken iron for anemia.

Episodes of cramping pain in the abdomen, of short duration, began in July, 1941. On one occasion a few months later he was seized with abdominal pain and vomited "coffee grounds." He recovered promptly. On February 12, 1942, he had violent abdominal pain and the familiar vomiting and diarrhea which became more severe. He went into shock which subsided with the administration of frequent doses of morphine and atropine. Another attack occurred on February 26, 1942.

A surgeon diagnosed an acute abdomen and a laparotomy was performed. A thrombus in a branch of the superior mesenteric vein was found; it was causing an acute intestinal obstruction of the terminal ileum. The spleen was enlarged. Due to the emergency, a complete blood count was not performed until after surgery. (The total leucocyte count was 180,000, 95 per cent of these cells being lymphocytes.)

Attack followed attack until a two-weeks course of x-ray therapy was given to the spleen and enlarged glands of the neck, beginning on August 13, 1942. This improved the blood picture and reduced the total leucocyte count to 11,200 (50 per cent lymphocytes) by August 26, 1942. Between attacks of tracheitis, colds and quinsy, and frequent abdominal cramps, the patient remained in poor health.

On June 25, 1943, treatment with dicumarol was started with the hope of preventing the complicating factor of thrombosis, and under continuous dicumarol treatment the patient has enjoyed remarkably active good health with no abdominal pain. The lymphocyte series has been gradually increasing since radiation but without any clinical deterioration. During the treatment with dicumarol there has been no evidence of hemorrhage in any part of the body. JOHN E. KIRKPATRICK, M.D.

Hardy, J. D., and Godfrey, L., Jr.: The Effect of Intravenous Fluids on Dehydrated Patients and on Normal Subjects. *J. Am. M. Ass.*, 1944, 126: 23.

The authors note the effect of intravenous fluids on the cardiac output, stroke volume, pulse rate, and

blood pressure of a group of dehydrated patients in comparison with similar observations made in a group of subjects not demonstrably dehydrated. Whether dehydration is the result of vomiting, diarrhea, inability to swallow, or electrolyte derangement such as occurs in diabetic acidosis, the intravenous administration of fluids is the mode of therapy usually relied on to restore the normal state of hydration and electrolyte balance. The dehydrated individuals experienced a pronounced increase in cardiac output after the infusions, while the normal subjects presented little or no such rise.

Blood was first drawn for determinations of the serum protein, serum chloride, and blood urea nitrogen. The cardiac output was calculated by the urea method and the correction of Cournand, Ranges, and Riley was employed. The technique used is described in detail. Following the readings of cardiac output, stroke volume, pulse rate, and blood pressure, 2,500 cc. of intravenous fluids were administered at a rate of about 20 cc. per minute. The first liter of fluid was usually an isotonic solution of sodium chloride; the second, 5 per cent dextrose in isotonic solution of sodium chloride; and the third, 5 per cent dextrose in water. Ballistocardiograms, pulse-rate, and blood-pressure readings were taken after each liter of fluid was administered.

The authors note that the cardiac output of the dehydrated group increased substantially with the administration of intravenous fluids, while that of the normal group underwent no such rise. The 3,000 cc. of fluid administered intravenously provoked no subjective symptoms in any of the normal subjects, but it was followed by a prompt diuresis.

The normal persons had to void frequently during the infusion and the dehydrated patients did not. In the latter group more fluid was retained in the body. The fluids given intravenously doubtless increased the circulating blood volume in most of the dehydrated patients described here. Intravenous fluids may cause effects in diseased subjects very different from those observed in healthy persons.

In conclusion, the authors note that the feeling of general well-being so often experienced by the dehydrated patient after receiving fluid intravenously is accompanied by concomitant objective changes in the circulatory dynamics. The maximum effect is quite often produced by the first liter of fluid and this amount may be sufficient in such instances in which there is danger of giving too much fluid intravenously. When giving fluids intravenously to dehydrated patients, one should remain aware of the increased work which such therapy imposes on their hearts. HERBERT F. THURSTON, M.D.

Kozoll, D. D., Popper, H., Steigmann, F., and Volk, B. W.: The Use of Gelatin Solutions in the Treatment of Human Shock. *Am. J. M. Sc.*, 1944, 208: 141.

Since human plasma or blood is not available in unlimited quantities, plasma substitutes are being developed from macromolecular substances. The first to be used was gum acacia, which has been discarded because it is deposited in the liver. Pectin, isinglass, and gelatin have been recommended.

This study deals with the results of treatment of shock in human beings by the administration of gelatin solutions. Gelatin is a mixture of various proteins, which vary in type and molecular size in different types of gelatins, according to their source and preparation. It can be prepared as a nontoxic solution, isotonic to plasma and somewhat more viscous than it. Experiments on rats, rabbits, and dogs at the Upjohn Research Laboratories, Kalamazoo, Michigan, have demonstrated that the gelatin solution used in these studies is well tolerated without toxic effects. The methods used in treating 52 patients are described by the authors.

In none of the patients was there any evidence of pyrogenic or other untoward reaction to the gelatin administration. No chills, abrupt rise of temperature, or complaints of pain were noted. No hemorrhagic tendencies were apparent. After the gelatin infusion, whole blood or plasma was given repeatedly without any complications. The mean of the hemoglobin, plasma density, total protein nitrogen, and hematocrit dropped markedly after the gelatin infusion and remained below control value for twenty-four hours. The hemoglobin decreased slightly less, and the total protein nitrogen significantly less than the hematocrit. The nonprotein nitrogen showed, on the average, an increase immediately and twenty-four hours later, but it was not statistically significant because of marked deviations in both directions.

The sedimentation rate, which was markedly elevated before treatment, rose consistently, the increase being statistically significant. The rise was maintained from twenty-four hours to five days. This increase in the sedimentation rate was not influenced by dextrose, saline solution, blood, or plasma given following the gelatin.

The systolic and diastolic blood pressures, which were markedly reduced before treatment, rose upon completion of the gelatin infusion and were maintained. An improvement of the pulse was observed, as well as a change in the skin from a cool and clammy condition, to a warm and dry one. No change in temperature or respiration was noted. In the great majority of cases, one gelatin infusion relieved extreme as well as moderate shock without any additional therapy.

In summarizing, the authors note that the administration of gelatin to patients in shock is a safe procedure. The only undesirable effect is the effect on the erythrocytes. The increase of the sedimentation rate which is generally found upon injection of macromolecular substances is an important disadvantage after marked hemorrhage. In cases of shock without severe hemorrhage, no evidence was found that the increased sedimentation rate was of clinical significance. No signs of venous thrombosis were noted. Absence of a low degree of antigenicity of gelatin has been demonstrated previously, as well as

the fact that gelatin is not stored in tissues to a significant degree in contrast to other macromolecular substances. Gelatin solution is an effective hemodiluting agent. The dilution of the red cells, as judged from hematocrit and hemoglobin, appears more marked than that of the plasma proteins. One thousand cubic centimeters of a 5 per cent gelatin in normal saline solution seemed sufficient to the authors in most cases.

In conclusion, the authors note that the results of future investigations will decide whether the nitrogen content of gelatin has nutritional value after its intravenous administration in shock, as it was found to have in experimental animals.

HERBERT F. THURSTON, M.D.

MISCELLANEOUS

Glaser, K.: Congenital Hereditary Lymphedema (Milroy's Disease). *J. Pediat.*, S. Louis, 1944, 25: 337.

The author reviews 2 cases of congenital, hereditary lymphedema observed at the Milwaukee Children's Hospital. The condition is extremely rare and the author is unable to find more than 50 families so affected which have been reported in the literature. In view of some very excellent reports on several generations, the hereditary tendency seems to be proved. The etiology seems to be entirely unknown and congenital malformation of the lymph vessels is widely accepted. Some possible causes are vasomotor disturbances, venous or lymphatic obstruction, or thrombosis.

The condition consists of a firm, pitting edema, affecting part of or the whole leg, or both legs, and never extending above Poupart's ligament. There usually are no pains or attacks or signs of inflammation and no constitutional symptoms. The skin appears to be physiological in color and temperature.

The laboratory findings, including blood chemistry and counts, urinalysis, basal metabolic rate, the Aldrich-McClure test, and x-ray pictures of the bone, are all normal. The pictures of the soft tissues show swelling and increased trabeculation of the subcutaneous tissues with radial arrangement of the trabeculae.

The few biopsies reported in the literature reveal enlarged spaces which may be lymphatics and increase of fibrotic tissue. The course is chronic and progressive unless treated. With treatment the edema can be reduced, but it resumes previous dimensions soon after regular activity is taken up and compression of the limb discontinued. Bandaging will reduce the swelling; it is, however, not very successful. The best results have been obtained with adhesive tape or pure rubber roller bandages. Elastic bandages and stockings as well as Unna's paste boots have been tried. In later stages, progressive fibrosis reduces the compression effect. The operative procedures of the type of the Kondoleon operation or that of Sistrunk have been successful in severe cases. Other surgical procedures are the insertion of silk or of celloidin. Sympathectomy has been attempted but was considered valueless.

The author reviews in detail 2 cases at the Milwaukee Children's Hospital and the treatment employed. The effect of the treatment was only temporary. The histological examination of the foreskin of one patient proved the presence of definite tissue changes, and ruled out the mere stasis of the lymphatic fluid or blood. The normal laboratory reports substantiate the fact that this is not a constitutional disorder.

HERBERT F. THURSTON, M.D.

SURGICAL TECHNIQUE

WAR SURGERY

Sarjeant, T. R., and Morton, W. A.: Delayed Suture of Soft-Tissue Wounds. *Lancet*, Lond., 1944, 247: 333.

Soft-tissue wounds uncomplicated by fractures or other serious injuries constitute half of all battle casualties. The desirability of the early recovery of such a large group is obvious. In the Allied armies, the accepted treatment is early débridement followed, if there is not too much skin loss, by delayed suture. Early closure of the skin not only prevents infection but also decreases the fibrosis and scarring that accompany slow healing.

The importance of suturing the "little wound" should be emphasized, particularly if the patient has no other injury; often it appears insignificant and in the press of more urgent work is not given adequate consideration. With suture, the wound should be healed in from seven to ten days and the patient returned to duty; without suture, infection develops, epithelization is retarded and the insignificant "little wound" takes several weeks to heal. Under ideal conditions the average rate of growth of epithelium from the wound margin is one-eighth inch a week, but infection retards this growth either along the whole margin or irregularly so that one or more areas of infected granulation tissue may persist for weeks. The longer a wound remains open with mild superficial infection, the more fibrosis develops deep in it and interferes with the blood supply of the new epithelium; epithelization of the central portion of the defect is thus extremely slow, and the new skin is prone to break down under the wear and tear of exercise.

The advantages of early closure of wounds cannot be denied, but the decision as to when and how to close them is not always easy. To ascertain the indications for suture the authors made a survey of 143 soft-tissue wounds, 100 of which were closed by delayed suture. The operations were performed by staff members of a Canadian General Hospital in the Mediterranean area during a six-month period.

The wounds were from three to one hundred and thirty-four days old, and from ½ inch in diameter to 9 inches long deeply involving muscle. In a sutured wound, complete healing within fourteen days was termed "success"; complete healing within twenty-one days "partial success"; and healing in more than twenty-one days "failure." In the 100 cases there was complete healing in 53 within fourteen days, partially successful healing in 20 within twenty-one days, and no healing in 27 after twenty-one days.

It is considered a mistake to close a wound under five days from the time of wounding since it is impossible to tell what degree of superficial infection is present, what additional necrosis may result from the trauma of the missile, or whether a deep-seated infection or foreign-body reaction will develop.

If no contraindications are evident after five days have elapsed, the wound should be sutured as soon as possible. In the first nine days the walls of the wound are soft and pliable and can be easily approximated, provided there is not too much loss of tissue. Between the eleventh and fifteenth days granulation tissue appears on the floor of the wound and a thin bluish line of new epithelium can be seen growing from the skin margins. This means that the walls have already lost much of their pliability; the skin margins have become adherent to the granulation tissue on the floor, and approximation may necessitate additional surgery such as undercutting of the margins.

The wounds which healed best had undergone early débridement consisting in minimal excision of the skin, adequate exposure of the depths, excision of all the damaged soft tissues, and removal of all the foreign material. The cleanest wounds were those covered by a very light plaster-of-Paris cast.

Cultures taken from the 100 wounds (79 of those that were subsequently sutured and 21 of the unsutured) showed that the staphylococcus aureus was the commonest offender, the streptococcus haemolyticus coming next; the latter, however, was not prominent until after twenty-one days. Up to ten days only single strains of bacteria were found; the combinations seen later almost always included the staphylococcus aureus with a diphtheroid. Criteria for the suture of wounds should be based upon the clinical appearance, not on the bacteriological findings.

After from five to nine days a débrided wound which is suitable for suture should show the surrounding tissues to be normal on palpation, not indurated and not tender, and the skin margins should show no reaction. If tenderness, reddening of the skin margins, purulent discharge, or necrotic tags of muscle, fat, or skin are present, suture is inadvisable.

Wounds from ten to twenty-one days old which are suitable for suture should show no sign of induration or tenderness, and the skin should be soft and pliable up to the very margin of the wound.

Before suture of wounds over twenty-one days old is done, the surrounding skin should be pliable. A shelving margin with a growing border of new epithelium should be present. The base should be covered by smooth granular beefy-red granulation tissue, and the exudate should no more than faintly stain gauze kept on the wound for twelve hours.

Dry gauze applied with firm pressure is the best postoperative dressing. Immobilization by plaster-of-Paris splints may be necessary.

Failures were commoner with wounds on the anterior surface of the leg, the lateral aspect of the thigh and greater trochanter, the upper medial por-

tions of the buttocks, and on the back. The factors concerned appeared to be tightness of the skin, tension of the deep fascia, inability to immobilize the part completely, and difficulty in preventing the patient from lying on the wound.

The antiseptic treatment which seemed most successful was the use of 1.4 eusol solution until the purulent exudate had diminished; then a change to 5 per cent saline solution; and, finally, alternation of these solutions every few days.

Approximately two-thirds of the wounds were insufflated with a sulfonamide powder at the time of the delayed suture, and one-third were not. Suture of wounds over ten days old was not appreciably affected by this treatment. For the wounds from five to nine days old, however, the sulfonamide powders seem to have been beneficial. It seemed expedient to emphasize that the local use of sulfonamide can never be anything but an adjunct to good surgery. STEPHEN A. ZIEMAN, M.D.

Rogers, L. S.: Abdominal Surgery in Forward Areas: Observations Made in a Casualty-Clearing Station, 1941–1943. *Austral. N. Zealand J. Surg.*, 1944, 14: 37.

The place best suited for abdominal surgery is the casualty-clearing station; separate resuscitation units working in advance of this station would only delay the arrival of the patient to the abdominal surgeon. The chief resuscitation ward is the preoperative ward of a casualty-clearing station. The x-ray plant is placed at the distal end of the preoperative ward; in every case of penetrating wound of chest, buttock, and upper thigh an x-ray examination in one plane is carried out as a routine. Two planes are used only in difficult cases.

If under resuscitative measures (sedation, blood transfusion, warmth) the patient improves and says that he feels better, operation is delayed until the diastolic pressure reaches 80 and the systolic 100. If there is no improvement, immediate operation is undertaken, after 2 pints of blood have been given to stop the internal hemorrhage. The time factor of itself does not preclude operation. Patients whose condition is three days old have been saved.

The incision varies with the condition found or anticipated: once an opening has been made into the abdomen, however, all free fluid is rapidly aspirated, also that in the pelvis. Control of the bleeding is undertaken first; if it is coming from the spleen, splenectomy is done; otherwise, undersewing with mattress sutures is done. All holes into the chest cavity are closed first. In exploration the start is made in the large intestine; if a hole is found, lateral mobilization and exteriorization of the part is in order. Next the ileocecal junction and the small intestine and stomach are explored, thoroughly and rapidly, each hole being clamped with a Poirier forceps. Finally the bladder is inspected. Repair is always better than resection when it is possible. End-to-end junction after resection is best for the small intestine. Simple suture is done. A Miller-Abbot tube should be guided through the pylorus at the end of the operation. In wounds of the rectum, bladder, and sigmoid colon the Trendelenburg position is used only after the pelvis has been aspirated. The pelvis should be drained after every perforating wound. Blood collection in this area often means a pelvic abscess later. The pelvic drain should be clamped when the operation is finished. Sulfadiazine emulsion is injected, and this is then washed into the abdominal cavity by a further injection of 30 cc. of sterile saline solution.

Postoperative treatment begins at once in all abdominal cases with continuous gastric lavage and suction. The nasal route is the best. With the tube in place the patient is allowed to drink whenever he feels like it. Three times a day the stomach tube is disconnected, and 500 cc. of hot sodium-bicarbonate solution are injected. Lavage and suction are maintained until intestinal movements are continually heard and flatus and feces are passed. Fluid balance is carefully watched. Fluids are given parenterally for the first two or three days, then a continuous rectal drip. "Flatus competitions are encouraged." Morphine, in doses of ¼ gr. every four hours and ½ gr. at night, is given continually for the first two days (sleep and rest to the bowel are necessary). The abdomen is inspected twice a day, and hot copious bowel washouts with postural treatment are begun the moment distention appears. When intestinal movements are heard continually and flatus is being passed, the stomach tube is clamped and fluids are allowed by mouth. If there is no residue at the end of four hours, the tube may be removed. If vomiting occurs, the tube is reinserted immediately.

Sulfathiazole is given intravenously while suction continues. A second dose of sulfadiazine emulsion injected down the pelvic tube has been found to cause intense pain and dysuria for twenty-four hours; it has therefore been given up.

Danger signs in abdominal cases are these: persistent hiccup which starts even during operation; slow persistent distention with a silent abdomen; continual anxiety and a high pulse rate; and diminution of the urinary output. In retroperitoneal wounds distention starts very early and is progressive. Stomach suction is not usually sufficient to deal with the ileus. Semierection of the penis is often present and is a bad sign. In these wounds the prognosis is usually bad. JOHN W. BRENNAN, M.D.

Macdonald: Observations on Battle-Casualty Compound Fractures and Joint Injuries in the Middle East. *N. Zealand M. J.*, 1944, 43: 172.

Macdonald describes his experiences as an orthopedic surgeon with a New Zealand hospital unit in the Middle East during 1941, 1942, and part of 1943, especially in regard to battle-casualty compound fractures and joint injuries. It must be understood that continuity of treatment by any one man of any one serious long-distance case seldom occurred.

The author is emphatic in stating that primary skin suture holds no place at all in front line surgery

(as it occurred in the Western Desert). It became standard technique to carry out simple surgical toilet of the wound followed by the insufflation of 10 gm. of sulfanilamide and the application of vaseline gauze without suture of the skin edges. He condemns the use of the "vaseline plug" as it was found that many wounds were packed too tightly and too voluminously. He recommends that a minimum amount of vaseline gauze be used, enough only to keep the wound edges gently open. Débridement as we know it was not practiced; it was found sufficient to remove only the obviously devitalized tissue and to open up for drainage any of the deeper spaces which might have become infected and then have pocketed.

"The Thomas Splint, if it ever needed vindication, has certainly received it in the Middle East." Macdonald states that all patients with femur and knee-joint injuries on whom the splint was correctly applied, traveled more comfortably and arrived in better condition than did those which were put in plaster. The "Tobruk" plaster (Thomas splints with added plaster-of-Paris) came out of this campaign. The badly fractured humerus was put up in treble V-shaped plaster, the elbow at 90 degrees, the forearm in neutral rotation, and the whole unit then bound across the front of the chest. Knee joints were treated on Thomas splints with fixed skin traction.

The author concludes by stating that the factors responsible for the good results were: massive transfusions, sulfanilamide, infrequent dressings, avoidance of primary skin suture, efficient splinting, recognition of the fact that the first operation is the one which counts, and "sending the surgeon to the patient rather than sending the patient back to the surgeon." J. M. MORA, M.D.

Churchill, E. D.: The Surgical Management of the Wounded in the Mediterranean Theater at the Time of the Fall of Rome. *Ann. Surg.*, 1944, 120: 268.

Foreword by Brig. General Fred W. Rankin, M.C.: "As Surgical Consultant to the North African and Mediterranean Theater of Operations and representative of this group, Colonel Churchill has done more than improve the quality of surgery performed in this Theater. Uniquely equipped to perform his mission and imbued with the true scientific spirit, he early recognized the inadequacy of certain preformed concepts in the surgical management of the wounded. With this flexibility of mind and with an elastic organization, he has utilized an investigative approach and drawn upon battlefield experience to evolve more rational and effective methods in the surgical care of the wounded. In this article, he has epitomized these observations and principles which constitute not only a contribution to war surgery but also to the advancement of medical science."

The surgery of warfare is divided into three phases of management. The initial and reparative phases of wound treatment are given overseas; the reconstructive phase is administered in the zone of the interior.

INITIAL SURGERY

Initial surgery in the battle area is intended to preserve life and limb by correcting the abnormal physiology resulting from the loss of blood and other body fluids. Included in the procedure are resuscitation and chemotherapy for the limitation and restriction of infection. Resuscitation makes possible the transportation of the casualty and permits him to withstand essential surgical operations. In the divisional forward areas, plasma is used. However, after admission to the hospital, it is replaced by whole blood which is procured and processed by special units. Over a four-month period, 16,000 pints of blood were delivered to the Fifth Army on the Anzio beachhead. Only Type "O" blood (universal donor) with an agglutinin titer below 64 and a seven-day expiration date was used. Other types of blood are maintained by unit blood banks in evacuation hospitals. The prevention of infection is attempted by means of débridement of the wound. Oftentimes it is impossible to recognize all devitalized tissue. Therefore, primary closure by wound suture is not performed. Only provisional or temporary fixation of fractures is performed because of the necessity of evacuation. The value of local sulfonamide chemotherapy is questionable. However, penicillin therapy is administered to all battle casualties except the slightly injured. Topically, it is used only in the meninges, serous cavities, and joints. Parenterally, it is continued beyond the expected period of infection. However, chemotherapeutic agents cannot be expected to prevent septic decomposition or render sterile any devitalized or avascular tissue. Nevertheless, penicillin has enlarged the scope of military surgery and opened vast new fields in wound management.

Initial surgery is not hasty, "slap-dash" surgery, but really precision surgery of a highly specialized type. It often involves the treatment of multiple serious wounds that require the co-ordination of surgical specialties. At the divisional clearing station first priority cases are evacuated for treatment to a nearby "first priority surgical" hospital. These hospitals are manned by highly trained and experienced personnel comprising an Auxiliary Surgical Group.

REPARATIVE SURGERY

As a result of the use of penicillin, reparative surgery at the base hospitals has been completely revolutionized in every surgical specialty. It must be distinguished from reconstructive surgery, which is a function of hospitals in the zone of the interior. At these base hospitals at least 25,000 wounds were closed by suture with healing in 95 per cent and no loss of life or limb. Wounds are closed by secondary suture as early as the fourth day after injury solely on appraisal of the gross appearance of the tissues after removal of the evacuation hospital dressing. Qualitative or quantitative bacteriologic analyses of

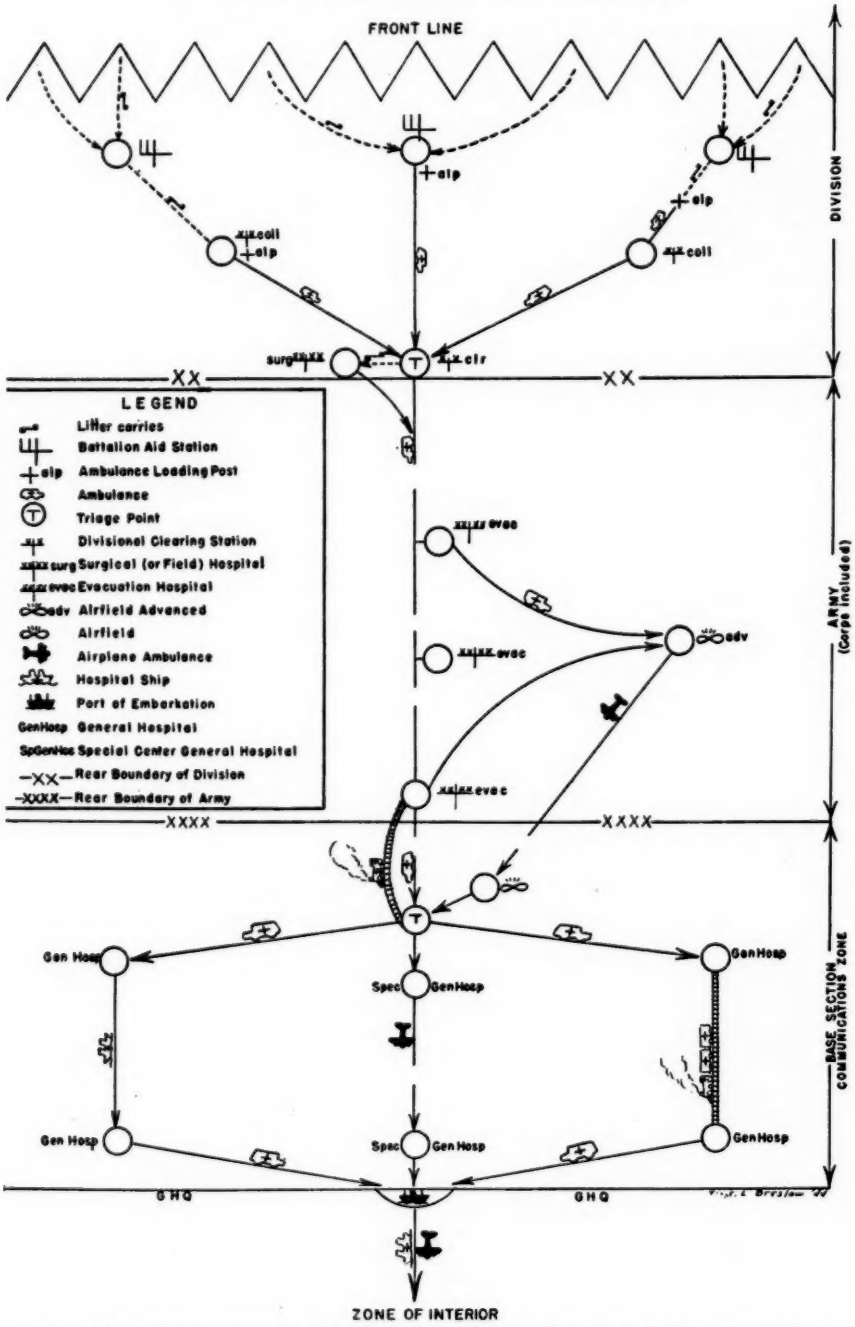


Fig. 1. Diagrammatic representation of an overseas theater. (Courtesy of J. B. Lippincott Co.)

wound cultures are of no special value since many wounds have been found to heal by primary intention, even in the presence of a profuse and varied flora. The most common cause of failure of secondary suture was due to infection caused by residual dead tissue. This may be detected at the first dressing by the discharge of pus and the inflammatory appearance of the wound margins.

Complicated wounds involving the soft parts and bony structures are the cause of the major part of reparative surgery. Compound fractures coming to base hospitals are removed from the transportation splints, the wound is revised, and the fracture is reduced. In this group of patients the continuous penicillin therapy from the inception of wounding through to the evacuation to the base hospital has been of great value. Combined with whole-blood transfusions for anemia, it has made possible reparative operations of the greatest magnitude and enabled the closure of original débridement incisions of compound fractures. Wounds of joints are treated by arthrotomy with the removal of devitalized cartilage and foreign bodies, after which the joint space is closed. In a severely traumatized joint, it may be even resected.

Massive organizing hemothorax is treated by thoracotomy, evacuation of the clot, and decortication of the lung. Post-traumatic empyema of the lung treated by surgery in combination with penicillin has resulted in rapid repair with full expansion of the lung. Advances in thoracic surgery have been such as to make possible the preservation of the maximum amount of lung tissue.

Skin grafts may be performed as early as the fourth day after injury. Primary suture of facial lacerations with splinting of the bony parts, plus control of infection, has resulted in a marked reduction of disfiguring mutilations. Early repair of intestinal fistulas and exteriorized segments of large bowel is performed at the base hospital with significant advantage. At this type of installation, craniocerebral wounds are closed and now even injuries of the peripheral nerve are repaired early.

Reparative surgery constitutes a new concept in military surgery. Just as the time-lag between wounding and initial surgery is related to the preservation of life and limb, so does the interval between initial and reparative surgery offer "golden" opportunities for adding to the preservation of life and limb.

BENJAMIN G. P. SHAFIROFF, M.D.

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

La Roe, E.: Breast Tissue as a New Source for Heterogenous Implants. *Am. J. Surg.*, 1944, 66: 58.

Fresh and preserved breast tissues are used as implants in plastic work. The first breast tissue was secured from pendulous breasts. The donor patient and the recipient had the same blood grouping. The sedimentation rate, coagulation time, and hemoglobin were within normal limits. The erythrocytes, leucocytes, and differential count were well within normal limits. The breast tissue, upon removal, was placed in a saline solution and kept warm.

Immediately after removal of the breast tissue, the recipient patient was surgically prepared and the defect caused by an amputation for a scirrhous cancer was prepared for the transplant. The transplant was patterned to proximate a normal breast and was sutured into position. The temperature of the patient was slightly elevated following the operation. On the eighth postoperative day there was a bloody discharge from the breast dressings. The hospital stay was sixteen days. On the twenty-ninth day there was a recurrence of the sanguineous and fatty discharge. Four-fifths of the original transplant remained. About sixty days postoperatively an additional sloughing occurred which lasted for ten days.

The breast tissue which was not used in this first operation was transferred to a sterile Tyrode solution and kept at a temperature of 45° F. Bacteriological tests were carried out periodically. On the seventh day portions of the preserved breast tissue were used in 2 operations. In the first, a portion was implanted in a defect of the forehead due to injury. This patient was discharged from the hospital on the third day. There was a primary healing on the seventh day. The end-result, at three months, appeared to be permanent.

In the second case, a portion of the preserved breast tissue was implanted to correct a deformity of the nose. The end-result appears to be satisfactory.

The steps in the preservation of the tissue in Tyrode solution are enumerated. The Tyrode modification and the preservation of human tissue appear to be satisfactory.

RICHARD J. BENNETT, JR., M.D.

Harris, H. I.: Heterogenous Skin Grafts by the Coagulum-Contact Method. *Am. J. Surg.*, 1944, 65: 315.

The author, stimulated by the works of Sano, reports the successful use of the coagulum-contact method for heterogenous skin grafts in 9 instances.

The histological changes on the application of a graft to the donor area are divided by Fomon into three stages: (1) the stage of plasmic circulation; (2) the stage of vascularization; and (3) the stage of organic union. The coagulum-contact method replaces the stages through which the tissue must pass in order to arrive at the same goal, and saves a period of from twenty-four to forty-eight hours. By the use of this contact method many hazards are eliminated. Shock is lessened by shortening the duration of the operative procedure and by lessening the quantity of anesthetic used.

The author paints the cell extract on the graft while it is still on the drum when the Padgett machines are used. In free hand grafts and in full-thickness grafts the graft must be placed upon some material such as gauze. Complete hemostasis must be accomplished in all cases before the grafts are

applied. In redressing patients, the author uses a warm saline pack or compress for a few minutes before re-applying the dressing.

HAROLD C. OCHSNER, M.D.

Elman, R.: Acute Starvation Following Operation or Injury, with Special Reference to Caloric and Protein Needs. *Ann. Surg.*, 1944, 120: 350.

Six nutritional elements, water, salt, protein, fat, carbohydrate, and vitamins, must be considered in discussing starvation.

In surgical practice, measures are taken to prevent water and electrolyte starvation, particularly by the simple injection of physiological saline solution. In addition, most patients receive a certain amount of carbohydrate, sufficient at least to prevent ketosis, although usually insufficient to meet all of the caloric needs. Vitamins, neglected for a great many years, now are given adequately even if the patient is unable to take any by mouth. The remaining elements are fat and protein.

Deprivation of protein and caloric needs, wholly or partially, although frequent, is, in general, viewed with complacency or considered inevitable. The supposition that tissue and other stores will supply safely the needs of the body has produced deleterious results. Wastage of body tissue, particularly tissue and plasma protein, is not without untoward effects which begin almost at once after protein is removed from the diet.

When a healthy, well nourished individual sustains a serious injury or undergoes a severe operation, starvation nearly always ensues. While the causes of such starvation are those which lead to deprivation of one or more of the nutritional elements, as a result of the injury, there follows an unusually large breakdown of protein tissue, the "toxic destruction of protein," which leads to protein depletion even with the intake of a normal well balanced diet.

Even though the food requirements are normal and the patient is able to eat, the dietary intake after injury or operation is nearly always inadequate because of the starvation imposed by the surgeon who fears that the ingestion of food will prove deleterious. Often only fruit juices and broth are permitted; such an intake leads to electrolyte or protein starvation or both. Excluding patients in whom it is necessary to keep the gastrointestinal tract at rest, as in general peritonitis, or in whom vomiting is present, such fear is usually without foundation. On the other hand, when the patient cannot eat or is vomiting, protein starvation will ensue because the usual parenteral injections contain only electrolytes and glucose.

Starvation in other patients may be due to partial or complete loss of appetite following the injury or operation, aggravated often by oversedation, particularly with morphine. Thus, there follows a failure in the normal impulses which ordinarily insure an adequate intake of food, and the patient left to his own resources does not eat, even when perfectly adequate trays of food are served. Ordinarily, anorexia ends quickly and spontaneously, and the patient soon begins to eat of his own accord; however, in many cases, anorexia persists and becomes a manifestation of starvation itself. Thus a vicious cycle is established by which the very effect of starvation becomes a further cause.

The effects of acute starvation after injury or operation are:

1. Loss of weight which, if water balance is maintained or its influence taken into account, means loss of body tissue; but its physiological significance depends upon which of the two body tissues, fatty or protein, is depleted. Loss of protein tissue can be measured clinically by the amount of nitrogen excreted, largely as urea and ammonia. Studies have shown that after injury or operation, as much as from 20 to 40 gm. of nitrogen may be excreted per day. By contrast, loss of fatty tissue, even if all of 2,000 calories were supplied by fat, would represent only 200 gm., or in terms of the tissue itself, 240 gm., or one-half pound, a day.

2. Asthenia. Most of the postoperative weakness or asthenia is attributed by surgeons to the operative procedure, but it may actually be due to starvation, particularly deprivation of protein. It has been shown that normal human beings who ingested a diet complete in all elements except protein developed after forty-eight hours severe symptoms of lassitude and asthenia, which were corrected rapidly by the ingestion of protein food. Elman has often observed that postoperative weakness was decreased by the intravenous injection of hydrolyzed protein; jejunal alimentation, beginning immediately after operation, alleviates most of the asthenia symptoms and, in addition, accelerates convalescence.

3. Nutritional edema is an important serious clinical manifestation of starvation and may involve the gastrointestinal mucosa. Moreover it may be responsible for delay in wound healing, anuria, and even circulatory impairment. All of these complications may follow severe injury and operation, and, besides certain physical factors, hypoproteinemia long has been recognized as the most significant cause of nutritional edema.

4. Lowered resistance to infection is demonstrated by the fact that the production of antibodies is but from one-third to one-fifth as great in protein-deficient animals with hypoproteinemia as in animals on a regular diet, and it is probable that many postoperative infections may be due in part to a lowering of the immunological response of the body, secondary to protein starvation.

5. Hypoproteinemia frequently occurs after operation or injury. Although published data on the extent vary considerably, hypoproteinemia frequently escapes detection because its existence is masked by two factors: (1) the albumin fraction which is obscured by an increase in the globulin fraction due to the infection; and (2) dehydration, which is responsible for a normal concentration of both fractions, although the total circulating protein is depleted.

6. Death. That a fatal outcome after injury or operation may be due to starvation is an inescapable conclusion in several instances. Extreme emaciation is always the prominent finding at postmortem examination.

Treatment of starvation is simple, consisting merely of overcoming the patient's loss of appetite with adequate food intake, looking to the palatability of the food and avoiding idiosyncrasies, making judicious use of sedation, and giving a diet complete particularly in adequate protein.

Three glasses of a drink made by stirring 100 gm. of skimmed milk powder into 200 cc. of water furnished 34 gm. of protein and 52 gm. of carbohydrate; these amounts exceed those in a quart of milk, with only one-fifth of its volume, and will meet the daily protein needs of a normal-sized adult. Solid food, such as eggs and meat, should be added as soon as possible. If necessary, parenteral or tube feeding after operation or injury may be employed. The bulk problem can be made easier by sacrificing some and perhaps even a considerable part of the caloric requirements.

Evidence indicates that a large part of the caloric needs may safely be sacrificed for short periods without physiological impairment provided an adequate protein intake is assured.

It may be more important to insure nitrogen balance with a high protein diet than to provide fat and carbohydrate for all the caloric needs. Should loss of body weight occur as a result of starvation, it is much more important that nonessential tissue fat, rather than essential tissue and plasma protein, be depleted.

Starvation may be avoided to a considerable extent by recognizing anorexia as a therapeutic challenge rather than an inevitable symptom. Because prevention of starvation is much easier than its cure, adequate nutrition should begin immediately after injury or operation. STEPHEN A. ZIEMAN, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Orr-Ewing, J., Scott, J. C., Masina, F. H., Trueta, J., and Gardner, A. D.: Local Sulfanilamide Treatment of Fresh Wounds in Complete Plasters. *Brit. J. Surg.*, 1944, 32: 83.

This investigation was aimed at obtaining incontrovertible evidence about the effect of local application of sulfanilamide on the bacteriological condition of compound fractures and other severe wounds treated by thorough cleaning, excision, and enclosure in plaster; and at correlating this evidence with the clinical results. The authors treated a series of cases with and without the local application of sulfanilamide, attempting to avoid any selection that might vitiate their conclusions.

They demonstrated a selective reduction of the wound flora by sulfanilamide, but did not establish a corresponding clinical effect.

HOWARD A. MCKNIGHT, M.D.

Connor, G. J., and Harvey, S. C.: The Healing of Deep Thermal Burns. A Preliminary Report. *Ann. Surg.*, 1944, 120: 362.

The chief cause of delay in the healing of deep thermal burns is the continued presence of the slough. Dead tissue is essentially powerless to combat infection; as long as it is present, successful skin grafting is impossible, and contracture continues. Hence the advantage of removal is fully realized.

Enzymatic digestion of slough in wounds has been tried with a proteolytic compound containing papain, urea and caroid in a saturated aqueous solution, and various other enzymatic compounds. Several of these, however, damage living tissue.

The hydrogen-ion concentration of the wound fluid is increased in many infected wounds, and preliminary experiments with local application of various organic and inorganic acids revealed that the separation of the slough could be greatly hastened if the *p*H of the surface of the wound was sufficiently lowered. Of the large series of acids studied, pyruvic acid presented outstanding advantages. With it the necessary balance between the *p*H and concentration of the acid can be obtained in order to accomplish the desired results.

Deep burns produced on dogs by the direct application of a low blue gas flame to the skin for twenty seconds over the dorsolateral aspect of the trunk resulted in a standard burn from 3 to 4 cm. in diameter and uniformly involved the full thickness of the skin.

The experimental wounds were dressed within a few hours after burning with a thick layer of paste consisting of a solution of pyruvic acid at a *p*H of 1.9, and of 8 per cent cornstarch.

The control wounds were dressed within a few hours after burning with either dry gauze, vaselined gauze, or a paste consisting of 8 per cent cornstarch in distilled water.

In the experimental series the slough separated completely within seventy-two hours, whereas in the control group the complete separation of the slough required from ten to twelve days. The slough softens on its surface and breaks up into many pieces which are firmly adherent. During the week before complete separation the wound is covered with a necrotic, stringy adherent layer.

The separation of the slough in the experimental group, however, appears to begin at the periphery, where, in twenty-four to thirty-six hours, there is slight softening. A plane of cleavage develops beneath the otherwise intact slough, and separation proceeds centralward. After forty-eight hours the cleavage has developed to the point where the slough, aside from soft dermal tags at the periphery, is either completely free, or loosely attached beneath its center. In another twelve to twenty-four hours separation is complete, with the slough lying free in one piece.

There is no evidence of digestion of the slough itself, and the skin adjacent to the burn appears undamaged.

Grossly, the resultant base is pink subcutaneous tissue. Within seventy-two hours after burning, this base is unusually vascular, and, histologically, exhibits evidence of early granulation tissue. The edges of the wound are sharp and clean, and are often tangential, as would be consistent with the more superficial damage at the very margins. The pink, clean base evident after separation of the slough accepts a split graft of skin immediately. This regularly takes, and all or part of the wound may be successfully treated in this manner.

The problem of infection is thus resolved, and the full objective of treatment achieved, even before the slough in the comparable control wound has completely separated.

The use of this method on man is being studied, but has not as yet been adequately tested, nor has a standardized procedure in all details been adopted. Until these have been done, application of the method for the purposes of treatment should be delayed. STEPHEN A. ZIEMAN, M.D.

McClure, R. D., Lam, C. R., and Romence, H.: Tannic Acid and the Treatment of Burns: An Obsequy. *Ann. Surg.*, 1944, 120: 387.

Twenty years ago the tannic-acid therapy of burns was begun at the Henry Ford Hospital. The authors of this article hope that this communication from a group working in the same institution will result in the abandonment of this type of treatment of burns and related methods. This unqualified recommendation is prompted by comparatively recent clinical experience and animal experiments by the authors and others. Under certain circumstances, the use of tannic acid produces a severe if not a fatal lesion in the liver, and carefully controlled experiments have shown that it moderately inhibits wound healing.

Four illustrative cases are reviewed. Two cases were treated with tannic acid, and 2 were treated with presumably inert vaseline dressings. Liver necrosis and jaundice were present only in the tanned cases.

The authors raise the questions: "If tannic acid is toxic to the liver and does local damage, why was it used for 20 years, and why was it adopted so enthusiastically almost all over the world? What about the much publicized mortality rate reductions? We fear that the largest factor was 'wishful thinking.'"

Liver necrosis has been reported in a considerable number of burned patients treated with tannic acid. Nonfatal cases frequently show marked disturbance of liver function in the acute phase of the burn. The liver lesion is easily reproduced experimentally. Wound-healing experiments on animals and on human donor sites indicate that tannic acid retards healing considerably. JOSEPH GASTER, M.D.

Jackson, A. V.: Liver Necrosis in Burns Treated with Tannic Acid. *Med. J. Australia*, 1944, 2: 352.

Since the outbreak of war the tannic-acid method of treatment of burns has been criticized from several points of view. It appears to be unsuitable for certain areas, such as the face and hands, because the rigid eschar is sometimes followed by ischemia. Also trouble is sometimes caused by sepsis hidden under the eschar. Of even more serious import is the suggestion, first made in 1942 by Wells, Humphrey, and Coll, that tannic acid may cause liver necrosis.

It appears from the review of the literature that pronounced liver necrosis is common in patients who die from burns treated with tannic acid, and is slight in or absent from those not so treated. However, the two groups—the tannic-acid group and the nontannic-acid group—are not quite comparable. Nearly all the patients not treated with tannic acid died before 1925, so that not only did they not have tannic-acid treatment, but they also did not have the benefit of modern ideas regarding the importance of hemoconcentration in burns and its control by intravenous serum therapy, nor were modern chemotherapeutic agents for the control of sepsis available. Consequently, the older patients frequently died in the first three days from serum loss, or after the eleventh day from sepsis.

In spite of the accumulating evidence to the contrary, therefore, it still remains a possibility that the failure to observe liver necrosis in patients who were not treated with tannic acid may have been due to the fact that most of these patients died (1) before liver necrosis (caused, for sake of argument, by some hypothetical burn "toxin" and not by tannic acid) had time to develop, (2) later, from septic infection of a burn not sufficiently large to cause much toxemia, or (3) perhaps after liver repair had been effected.

The need of further evidence of the toxicity of tannic acid in human beings prompted the author to examine the livers of 8 patients who died from burns. All patients, except 1, died between the third and eleventh days. In the livers from 2 patients treated with tannic acid and silver nitrate, extensive hepatic necrosis was found. In the livers from patients whose burns were not treated by tanning, cloudy swelling was the only abnormality found. JOSEPH K. NARAT, M.D.

Osborne, R. P.: The Treatment of Burns and Wounds with Skin Loss by the Envelope Method. *Brit. J. Surg.*, 1944, 32: 24.

Thirty-one cases of burns were treated during a nine-month period. Six were recent burns, 13 were unhealed wounds, and 12 were old burns.

Envelopes of the Bunyan-Stannard type were used, the envelopes being sterilized previous to use.

An anesthetic usually is given with the application of the first envelope. Application of the envelope consists of arranging a rubber sheet beneath the area to be treated so that the overflow runs into a receptacle. Previous dressings are removed, the wound photographed, and a smear taken for bacteriological examination. An irrigation with 1 per cent sodium hypochlorite at 110 degrees is carried out and then

the sterilized envelope is applied. The same solution is used for irrigation through the envelope. Five pints are used for an extremity. The envelope is allowed to drain for from five to ten minutes, then the interior is dried by air blown through with an electric hair dryer. Subsequent irrigations are carried out three or four times a day. Irrigation is ordinarily painless. When a smarting sensation is complained of, the concentration of the solution is reduced.

Dermatitis in the form of furunculosis may be seen on undamaged skin within the envelope after two or three days; possibly it is due to insufficient drying.

Excess granulations are controlled by pressure dressings. Spints may be applied outside of the envelope if necessary. Active movements are carried out from the start. Delayed healing occasionally occurs but is accelerated by the removal of the envelope. The life of an envelope is usually from three to five weeks. Sometimes the regenerated epithelium is quite fragile and it is necessary to do a skin grafting. Skin grafting of the Thiersch type may be carried out safely after hemolytic streptococci have been eliminated, this being determined by three successive negative reports. Grafts are applied in sheets or the chessboard variety is used. The chessboard type is obtained by cutting the skin in ¾-inch squares. These ¾-inch squares are then applied to make the chessboard pattern. The envelope and a pressure dressing are then applied. Pressure dressings are removed on the third day. Irrigation (1 to 20) is carried out twice daily. There are no dressings after the seventh day.

Several of the cases are discussed in detail as to the condition on admission, treatment, and bacteriology. The improvement of the patients' condition and the maintenance of full function in every case is very noteworthy. Risk of infection and crossinfection are avoided by this method.

When bacteriological examination showed the presence of the hemolytic streptococcus at the time of the application of the envelope, all of these organisms disappeared, although in some cases sulfanilamide was required.

No cases of deformity occurred when the envelope method of treatment was used.

RICHARD J. BENNETT, JR.

Clarkson, P.: Late Closure of Wounds. *Lancet*, Lond., 1944, 247: 395.

Late wounds are best closed by a radical attack which, by excision of granulations, the fibrotic base, and the new skin back to good surgical material, aims at reconstitution of the original defect in a clean field. This defect is then closed at the same operation.

Closure of the local tissue is possible in most of these wounds, and closure in as straight a line as possible gives the best functional results and earliest sound healing.

Direct approximation and secondary suture, after wide undermining, is the most widely applicable method (40 per cent in this series); but more distant tissue may be made available by transferring it over the defect on a swing or rotation flap in a good percentage of cases (33 per cent of this series).

The upper limit of these local closures in the trunk, and proximal parts of the limbs, lies between 80 and 200 sq. cm., and depends on the site of the defect. Defects of 80 sq. cm. in the elbow or upper regions of the calf can be closed by local tissue with rotation flaps, and abdominal and flank tissue up to 200 sq. cm. can be made available for trunk defects.

There is no contraindication to a free graft if it will take; but earlier and sounder healing is obtained when local tissue can be made to close the wound. A wound more than from six to eight weeks old does not offer a good prospect for 100 per cent take and sound healing of the graft. A free graft is nearly always necessary, at least in part, for defects of more than 120 sq. cm. In such large defects the free graft can often, with advantage, be combined with a local flap to provide both a skin and fat cover for special parts of the wound.

With increasing use of delayed primary suture and early secondary suture, combined with local penicillin, the percentage of wounds needing late closure may be expected to decline sharply.

Soft-tissue wounds, however extensive, should all be soundly healed within six weeks of the injury. The surgeon must be able to achieve this for his cases, or else should send them early to a center equipped to do so. JOHN J. MALONEY, M.D.

Lockwood, J. S., White, W. L., and Murphy, F. D.: The Use of Penicillin in Surgical Infections. *Ann. Surg.*, 1944, 120: 311.

This article presents the experiences and results of penicillin therapy in surgical infections. It portrays what has been learned by one of the participating groups of investigators working under the program of the Subcommittee on Infected Wounds and Burns of the National Research Council regarding the scope and limitation of penicillin in surgical infections. It brings out, moreover, the extent to which penicillin gives promise of meeting some important deficiencies of the sulfonamides, through its effectiveness in the presence of pus, its powerful action against staphylococci, and its lack of toxicity.

A brief review of the history of penicillin and its properties as a chemotherapeutic agent is given. The organisms against which it is effective and those which are resistant are enumerated.

The local use of penicillin either by itself or in conjunction with systemic therapy has given results which are highly encouraging. Emphasis is properly placed on the necessity for careful bacteriological study of every case in which the drug is used in order to determine whether or not the causative organism is susceptible or whether resistant strains of staphylococci or streptococci will be encountered, which will require more intensive treatment.

Within eighteen months about 440 patients have been treated. The diseases encountered were of

many varieties, both medical and surgical, and except for special research cases of chronic osteomyelitis and pulmonary suppuration, all of the patients were critically ill. Moreover, most of them had received intensive sulfonamide treatment without success for periods of from two days to several weeks.

Four main groups of cases are discussed: acute disseminated sepsis, and localized infections of the serous cavities, soft tissues, and bone, respectively.

1. Among the cases of acute disseminated sepsis (bacteria and meningitis) there were 57 patients with staphylococcic bacteriemia, two-thirds of whom survived; 15 with streptococcic bacteriemia, and 50 with suppurative meningitis, 43 pneumococcic and 5 staphylococcic. The patients with staphylococcic bacteriemia probably illustrate better than any others the important position of penicillin as a chemotherapeutic agent. Whenever possible they were treated by the continuous intravenous drip method and received doses of from 60,000 to 150,000 units in each twenty-four-hour period. With impressive regularity these patients tended to show improvement within forty-eight hours and, unless complications had developed, were clinically recovered from the acute disease within three to seven days. The complication most likely to interfere with successful treatment was vegetative endocarditis, which developed in 10 cases. In most of these cases of bacteriemia no resort was made to surgical treatment of the foci of infection during the acute septic phase, because in the face of progressive improvement in the patient's condition it seemed wise to defer operative procedures until a time of election. In several instances the foci subsided without drainage, particularly those developing in well vascularized tissues about the face and in the lung. When localization occurred in bone it was usually necessary to resort to surgical drainage ultimately.

Cases of meningitis, with or without bacteriemia, particularly those due to staphylococci, have responded promptly, at times even without intrathecal treatment, but in pneumococcic meningitis a daily injection of about 10,000 units of penicillin into the lumbar spinal canal, cisterna, or ventricles is imperative, and recent experiences suggest that the cisterna injections are particularly advantageous in severe infections. In meningitis it remains a matter of great importance to explore potentially infected mastoids when a prompt clinical response is not forthcoming.

2. Under localized infection in serous cavities are discussed empyema, suppurative arthritis, and peritonitis. When empyema is due to an infection with a penicillin-sensitive pneumococcus, staphylococcus, or streptococcus, in pure culture, and treatment is instituted within the first few weeks, it is possible to bring about sterilization of the cavity and ultimate cure, without resort to thoracotomy drainage. Frequent aspiration of the cavity and injection of from 10,000 to 25,000 units of the drug rapidly brings about sterilization of the cavity.

In the acutely ill, systemic treatment in combination with local injection is given.

Complete restoration of function has occurred after staphylococcic arthritis, and in cases of primary peritonitis from hemolytic streptococci or pneumococci the infection would be expected to respond favorably to penicillin treatment. Less certain, however, would be the results of treatment of infections developing after appendicitis, including pylephlebitis and perihepatic infection.

3. Under "localized infections in soft tissues" are discussed such topics as cellulitis of the face and orbit, boils and carbuncles, and pulmonary suppuration. Particularly striking have been the results of treatment in patients with cellulitis of the face and periorbital tissues. The recuperative power of these well vascularized areas is illustrated by the frequency with which penicillin treatment has been sufficiently effective to prevent suppuration in areas of facial cellulitis.

There is every reason to believe that the management of boils and carbuncles will be improved by combining penicillin therapy with surgical removal of devitalized skin, fat, and fascia. The spread of cellulitis and localization of the suppurative focus usually occurs within two or three days after systemic therapy is started.

The treatment of patients with chronic putrid lung abscesses has not yielded striking results, perhaps because many of the bacteria in these lesions are resistant to penicillin. The most that can be reasonably expected of the drug in these cases is to improve the condition of the patient for operation and to reduce the incidence of postoperative infection of the pleural cavity.

Penicillin cannot be expected to have a lasting curative effect in chronic bronchiectasis, but it may be used as a means of preparing septic cases for surgical treatment.

4. In cases of acute hematogenous osteomyelitis of the long bones, with or without bacteriemia, penicillin therapy will usually bring about rapid disappearance of evidence of disseminated sepsis, and usually there is a fairly prompt regression of the signs and symptoms of local inflammation at the site of localization.

The administration of penicillin to patients with chronically draining sinuses harboring staphylococci or streptococci will usually bring about a marked reduction in numbers or even disappearance of these organisms in the exudate, but direct culture of curettings from these sinuses may reveal persistent organisms not apparent on an ordinary swab culture. If no sequestrum is apparent roentgenologically, the sinus may even become completely healed during the course of two or three weeks of treatment.

It was concluded that when penicillin was administered systemically it modified the course of most infections in which the causative organism was sensitive to penicillin in vitro.

Dramatic curative responses in disseminated sepsis were observed, particularly when the circulation in the localized distributing foci was adequate to effect a contact between the drug and the bacteria. In

such cases surgical treatment, which would have seemed unavoidable in the past, could be postponed or avoided altogether by the use of penicillin.

Favorable responses, characterized by subsidence of toxemia, correction of anemia, rapid healing of infected or seriously contaminated wounds, and elimination of infection within the pleural cavity or joints, occur as well as failures. The latter occur particularly when the organism is insensitive or when the lesion under treatment is attributable only in part (or not at all) to the persistent activity of penicillin-sensitive bacteria, and under conditions in which penicillin cannot be brought to the infected area because of poor circulation or limited transport of the drug.

Careful bacteriological studies are essential if penicillin is to be used with maximal effectiveness.

STEPHEN A. ZIEMAN, M.D.

Bigger, J. W.: Inactivation of Penicillin by Serum. *Lancet*, Lond., 1944, 247: 400.

Penicillin is inactivated by contact with human serum or blood. The degree of inactivation varies greatly with different specimens of serum and is much greater at body temperature than at lower temperatures.

This inactivation may lead to underestimation of the amount of penicillin in a patient's serum. Inactivation in vivo is probably important chiefly in cases in which the excretion of penicillin by the kidneys is slow. JOHN J. MALONEY, M.D.

ANESTHESIA

Whalen, E. J.: Anesthesia in Peroral Endoscopy. *Ann. Otol. Rhinol.*, 1944, 53: 469.

This article reviews anesthesia in peroral endoscopy. The endoscopic examination is not always possible under local anesthesia and general anesthetic methods are sometimes necessary.

It is suggested that all cases be individualized as to preanesthetic preparation and selection of type of anesthesia. The purposes of preanesthetic medication are elucidated and such drugs as pentobarbital sodium, morphine, and scopolamine are discussed. In practice, the ideal "state of tranquility" is effected by the use of morphine sulfate (gr. ¼) and scopolamine (gr. 1/100). If these are given to an adult one hour before the administration of cocaine anesthesia for peroral endoscopy, the patient will be quiet and co-operative and the amount of cocaine necessary to produce satisfactory anesthesia will be reduced to a minimum. When morphine and scopolamine are to be used a 1:25 ratio is maintained. The preanesthetic preparation of the patient with proper selection of the preliminary medication is of the utmost importance whether the basic anesthesia is of the local or general type.

Cocaine in 5 per cent strength has been found very satisfactory for the endoscopic procedures; the technique of using it is described in detail. The general inhalational anesthetic agents are discussed. Pentothal has been found to be an anesthetic of high value when a general anesthetic is indicated. The disadvantages which are connected with its use can be anticipated and partly overcome. The administration of morphine and atropine one hour before the induction, and the spraying of the pharynx and the larynx with cocaine hydrochloride (5 per cent solution) are methods used to prevent laryngospasm. Curare is a recent addition to the endoscopist's armamentarium, producing muscular relaxation in these cases of muscular spasm. Avertin is used infrequently because of its respiratory depression and the slow return of reflexes after its use.

Apomorphine (gr. 1/40) is suggested as a counteractant of the ill effects of scopolamine overdose. Morphine has been discontinued in children and infants because of a few unfortunate experiences. The need for a clear airway is stressed. The respiratory depression which may occur during pentothal anesthesia must be treated by the establishment of a patent airway, and inflation and aeration of the lungs.

Infants do not require anesthesia and preanesthetic medication for any endoscopic examination or operation. Children from three to fifteen years require general narcosis. This is best obtained with ether, usually given by the open drip method. A small dose of atropine (gr. 1/200 for the child of ten, gr. 1/300 for the child of five) is good premedication.

MARY KARP, M.D.

Buch, I. M., Newton, L., and Posner, A. C.: Continuous Caudal Analgesia in Obstetrics. *Am. J. Surg.*, 1944, 66: 68.

One hundred and thirty cases of caudal-block anesthesia were reported by the authors; in 50 cases single injections were made. The first 115 patients received 2 per cent procaine and the last 15 received 1.5 per cent metycaine. Continuous drip infusion was preferred because, once set up, it is automatic, it requires less unusual equipment than other methods, and the obstetrician can visit the patient at his own convenience rather than at specific intervals, as is required when other methods are used. A 19 G needle of 2½-inch length was used for the initial injection. After the test-dose period, the needle was replaced by a 13 G needle through which a No. 5 ureteral catheter was threaded. The catheter was then hooked up to a graduated container connected by means of a Murphy drip chamber. The rate of flow usually required was about 12 drips a minute of 2 per cent procaine, or 1.5 per cent metycaine.

Seventy-three of the patients were primiparas and 57 were multiparas. The amount of 2 per cent procaine required for a full initial effect was from 40 to 50 cc.; and the amount of metycaine usually needed was from 30 to 35 cc. Two postpartum abdominal sterilizations proved refractory as to the height of the anesthesia. Caudal block has been discarded by the authors as being too unreliable for abdominal surgery because of the time factor and the occasional refractory cases.

The full effect of anesthesia from the initial dose was usually reached within fifteen or twenty minutes. The average duration of labor from the onset of the caudal block was three hours and fourteen minutes, the longest labor being eight and one-half hours.

Continuous caudal block had no effect on the duration, intensity, or frequency of uterine contractions, but it had a relaxing effect on the cervix. After the discontinuation of the drip or after a single injection, analgesia lasted an average period of one hour and twenty-four minutes.

Motor paralysis of the legs was more frequent among the patients who had had continuous caudal block of long duration. In only 1 instance was the drip discontinued because of a marked fall in blood pressure.

Complications were few: excitement and disorientation occurred in 9 cases, chills in 4, burning in 5, nausea and vomiting in 8, dizziness in 3, nonuterine pain in 10, uncontrollable desire to defecate in 1, and unilateral anesthesia of the perineum in 2.

The mechanism of caudal anesthesia was discussed. Absorption begins immediately and goes on continuously, and its rate is never constant. A fair amount of procaine must be absorbed without entering into protoplasmic combination to produce anesthesia, and without even serving the usual function of maintaining that combination. If procaine is injected as soon as the caudal effect begins to wear off, only a small amount is necessary to maintain the anesthetic level. If this level is allowed to fall, however, the amount of free procaine will fall considerably below the critical level in a large region, and considerably below the desired upper level. To regain the original level of anesthesia will now be a much more difficult problem.

The results in 97 cases were wholly successful. In 19 cases the block, though effective, was discontinued before delivery, and in 14 cases there was complete or partial failure, or the dura was penetrated. Thirteen cases were refractory; that is, the usual initial dose produced only a partial effect. In these cases, small doses were injected at intervals until complete analgesia was obtained. Temporary motor paralysis of the lower extremities was noted in 13 cases.

Among the 49 patients in whom the blood pressure was carefully watched, 31 showed some depression; in 18 patients the systolic fall was at least 20 points. There were 2 fetal deaths in the series.

In conclusion, the author believes that confidence should be maintained in the method. In its present state, however, the inherent disadvantages obviate its universal use and thus preclude its acceptance as the long-awaited panacea. MARY KARP, M.D.

Williams, D., and Sweet, W. H.: The Constitutional Factor in Anesthetic Convulsions. *Lancet*, Lond., 1944, 247: 430.

The purpose of this article is to report the results of electroencephalographic investigations of a series of cases of anesthetic convulsions and to discuss the significance of the results obtained.

Of 42 patients with anesthetic convulsions, 40 had had ether, the majority with nitrous oxide and oxygen; 11 had inductions with ethyl chloride; 1 had had pentothal, and 1, divinyl ether. Electroencephalography was carried out on 22 of the patients, 13 of whom were males; 5 were children. Only a third had had acute inflammatory disorders requiring surgical intervention. The majority were "clean" cases and had a normal temperature at the time of operation. All anesthetics had been administered by experienced anesthetists, and in every case the diagnosis of anesthetic convulsion was certain.

Abnormal electroencephalographic records were obtained from about three-fourths of these cases. Paroxysmal outbursts of abnormal cause were seen in more than half, and larval epileptic headaches in a fourth of them.

The incidence and nature of the different abnormal discharges seen were identical with those found in idiopathic epileptics.

All the evidence presented supports the view that anesthetic convulsions are primarily due to an inborn but latent epileptic liability. Factors which arise during anesthesia were mainly the precipitants of the convulsion. MARY KARP, M.D.

Thompson, G. N., McGinnis, J. E., Van Harreveld, A., Wiersma, C. A. G., and Tietz, E. B.: Electronarcosis. Clinical Comparison with Electroshock. *War Med.*, Chic., 1944, 6: 158.

Electronarcosis has been used as an anesthetic agent for animals. A clinical examination of this method in the treatment of schizophrenia was made in a study of 50 patients and the results were compared with those in a similar series of cases of patients treated by electroshock and by insulin. The conclusion was that electronarcosis is superior to electroshock for schizophrenia, and is similar to insulin in its efficacy in the treatment of this disorder.

The standardized electronarcosis technique was described in detail. A current of from 160 to 250 ma. was applied through electrodes bitemporally placed and was maintained for thirty seconds; at the end of this time the currents were dropped to between 60 and 75 ma. At the end of from sixty to seventy-five seconds, the current was raised at the rate of 5 ma. every fifteen seconds to a maximum of 125 ma. at five minutes. The treatment was usually terminated at seven minutes.

Certain neurological signs were seen constantly during the narcotic state produced by electronarcosis. These were described and compared with electroshock.

In all three groups of patients studied, there was an initial cardiac arrest which usually lasted from three to seven seconds. In electroshock the tachycardia began shortly after the clonic phase, or at about twenty seconds, and return to normal occurred usually within a few minutes. During the

entire duration of the current in the electronarcosis, the tachycardia continued and sometimes increased to rates of between 140 and 160 or sometimes even higher.

The principal difference was a prolongation of the stimulation of the autonomic nervous system, but other phenomena not observed in electroshock were observed, such as prolonged flexor tone and forced grasp. During deep insulin coma, autonomic phenomena such as flexor tone and forced grasping were similarly present. The reactions of the patient during the postconvulsive phase of electronarcosis resembled those observed during insulin coma. It is believed that in its present status electronarcosis is not practical as an anesthetic device for human beings.

MARY KARP, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

Frantz, V. K., Clarke, H. T., and Lattes, R.: Hemostasis with Absorbable Gauze (Oxidized Cellulose). *Ann Surg.*, 1944, 120: 181.

A series of experiments were undertaken to reproduce, as nearly as possible, lacerated bleeding wounds such as those which in clinical practice might necessitate gauze packing. No adjuvant to promote clotting was used, and no immediate effect was expected other than cessation of bleeding inherently due to the presence of the absorbable packing. These observations are based on experiments in which the wounds were made with the animals under general anesthesia, and with aseptic precautions.

The oxidized gauze was easier to pack into a bleeding wound than ordinary gauze. It seemed more pliable, and, when wet with blood, slightly sticky. The oxidized gauze, used dry, was observed to swell when saturated, easily filling all the irregular crevices in the wound. The combination of blood and oxidized gauze resulted almost immediately in a dark brown or black mass and as soon as this discoloration occurred bleeding usually ceased. The hemostatic effect appeared to depend not on clotting within the meshes of the gauze but on the swelling of the material and its sticky character when blood-soaked, so that the packing itself took the place of clot.

The authors have not studied any possible direct effect on the clotting process. Neutralization of the material with calcium acetate resulted in the loss of the described properties, and rendered it less effective as a hemostatic. As early as twenty-four hours after packing, the oxidized gauze was so friable that it broke when an attempt was made to withdraw it, in contrast to ordinary gauze which could be withdrawn, but which in clean wounds, especially, was usually stuck, so that force was necessary for withdrawal. With ordinary gauze, removal was apt to be followed by bleeding, which sometimes required secondary packing. With oxidized gauze in an open wound for forty-eight hours, the gelatinous mass of brown material which represented the blood-soaked packing could be gently scraped away from the wound surface without renewal of the bleeding. Oxidized gauze, even when not absorbed early, was not invaded by reparative tissue. The foreign body, therefore, was not incorporated in scar to any extent, and scarring was minimal. The absorbable gauze has also been used for hemostasis in 17 clinical cases.

This material, even though soluble and relatively non-irritating, is a foreign body in the tissues and remains as such often for several days. It should be used, at least in wounds which are closed without drainage, in as small quantity as possible. It is not a substitute for meticulous surgery, and surgical principles must not be violated in its use.

LOUIS T. BYARS, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Rendich, R. A., and Harrington, L. A.: Roentgenologic Observations in Mesenteric Thrombosis. *Am. J. Roentg.*, 1944, 52: 317.

Although mesenteric thrombosis as a clinical entity has been recognized for over one hundred years, very little attention has been given to the radiological diagnostic aspects of the disease.

The authors found one striking common finding in 3 cases: the KUB film of the abdomen revealed a distention of the intestinal loops and right half of the colon simulating a mechanical block. Gas collection ended abruptly at the splenic flexure. Gas distribution in the distended bowel corresponded to the distribution of the superior mesenteric vessels. The authors were somewhat surprised to find that no mechanical block existed when the patient was examined after he had been given a barium enema. This they have called a "sign-complex"; that is, the KUB film indicates mechanical intestinal obstruction, whereas the barium enema reveals a colon filled with barium and no evidence of a block.

Three cases of mesenteric thrombosis are reported in which roentgenograms revealed distention of the intestines and right half of the colon, corresponding to the superior mesenteric artery. It is the opinion of the authors that an early diagnosis aided by the roentgen findings offers an excellent opportunity for bowel resection and eventual recovery.

MAURICE D. SACHS, M.D.

Sahler, O. D., and Hampton, A. O.: The Roentgen Appearance of Common-Duct Stone. *Am. J. Roentg.*, 1944, 52: 298.

Common-duct stones can often be demonstrated on plain abdominal roentgenograms or spot roentgenograms of the bile-duct area. They should be suspected in any case in which calcification is seen in the region of the gall bladder or common duct, in which calcium bile milk is demonstrated, or in which the patient is jaundiced. The fact that common-duct stones can be seen on the plain roentgenogram is not generally appreciated. This is probably due to two factors: the relative infrequency of common-duct stones, and the difficulty in demonstrating their location accurately.

Diagnosis of common-duct stone from the plain roentgenogram is dependent upon the presence of sufficient calcification to give a positive shadow. At the Massachusetts General Hospital, Boston, about 2 cases of easily demonstrable common-duct stones are seen per year at the present time.

The chief difficulty in the diagnosis of the common-duct stone without a contrast substance lies in establishing the correct location. The differentiation of common-duct stone from renal or cystic stone is the first problem to be solved. Since a stone in the cystic duct may lead to hydrops of the gall bladder, while one in the common duct would not do so, the finding of a mass in the gall-bladder region associated with calculus is indicative of a cystic-duct stone. The cystic-duct stone may, however, not necessarily cause hydrops. If; in the anteroposterior projection, a stone is seen to lie in the region of the duodenum or duodenal loop, the conclusion that it is in the common duct is justifiable since it will be below the juncture of the cystic and common ducts. In a rare case in which a dye study of the gall bladder has been made in addition to the plain roentgenogram, a diseased gall bladder may be found which retains its power of concentrating dye and subsequently contracts after a fatty meal. In such an instance, however, the bile duct would probably be outlined by dye and stones could still be accurately located.

HAROLD C. OCHSNER, M.D.

Kenny, M.: The Clinically Suspect Pelvis and Its Roentgenographic Investigation in 1,000 Cases. *J. Obst. Gyn. Brit. Empire*, 1944, 51: 277.

Roentgenographic examination was made in late pregnancy in 1,000 women. The objective of this survey was to determine whether or not roentgenograms could be of aid in those cases in which a previous history of abnormal labor or the clinical examination caused the physician to fear abnormal delivery.

The following types of conditions were investigated: (1) clinical pelvic contraction; (2) cephalopelvic disproportion; (3) fetal malpresentation; (4) clinical evidence of bone pathology; and (5) women who had had a previous prolonged labor.

Before the beginning of the present world conflict, a combination of Thoms, Caldwell-Moloy, Roberts, and Rowden methods was used. As films became scarce and the diagnostic ability of the author improved, a single anteroposterior film of the pelvic brim or even a lateral view would suffice. In all cases, an attempt was made to forecast labor. With increased experience, the incidence of error in roentgenographic forecasts was low.

The Caldwell-Moloy classification of pelves was used; that is, gynecoid, android, anthropoid or pithecoid, and platypelloid. Of the 1,000 cases examined, more than 900 belonged to the gynecoid, android, or some combination of these types; 64 were anthropoid (pithecoid), 18 platypelloid, and 6 pathological.

A marked conformity was found between the physical form and the pelvic type. In 532 cases, the physical appearance and pelvic type conformed: 81.6 per cent (38 cases) anthropoid type; 78 per cent (118 cases) android type; 67.7 per cent (233 cases) gynecoid type. There were 106 cases in the androgynecoid group and 43 in the gynecoandroid group.

A history was available in 540 of the 1,000 cases. Toxemias of pregnancy were in mild or severe forms:

they occurred in 8 per cent of the gynecoid type; 10.9 per cent of the gynecoandroid; 78.5 per cent of the android; 57.7 per cent of the androgynecoid; 5.1 per cent of the anthropoid, and 12.7 per cent of the platypelloid. Puerperal morbidity was 23.9 per 1,000 cases and was higher in the android group.

As a result of the study, the author believes that external antenatal measurements are negligible. There is no constant relationship between external and roentgenographic measurements. In pelviroentgenographic interpretation, attention is given to the conformation of the sacrum and the posterior sagittal diameter of the midpelvis. During the six years in which this study was made, 10,197 women were delivered and roentgenographs were taken in 1,000 suspected cases. Of the 178 cesarean sections, 145 were done in the suspected group. Three hundred and seven of 342 forceps deliveries were done in the suspected group also. The gynecoid and android pelves showed the lowest mortality rate. The author believes that routine pelvic roentgenographic measurements are essential, especially in the primigravidas, and that undoubtedly they would help reduce untimely and ill-advised surgical procedures.

MAURICE D. SACHS, M.D.

Epstein, B. S., and Davidoff, L. M.: Iodized Oil Myelography of the Cervical Spine. *Am. J. Roentg.*, 1944, 52: 253.

The authors had the opportunity to study clinically and by means of iodized-oil myelography 5 cases of rupture of the nucleus pulposus of the lower cervical spine. There were 76 cases in the entire series of ruptured intervertebral discs, the remaining 71 occurring in the lower lumbar spine.

The myelography was performed by the lumbar route. With care it was possible to prevent entrance of the iodized oil into the cranial cavity, but when the oil did enter, no difficulty was encountered in returning it to the spinal canal after the patient was placed in the upright position.

The detailed technique was as follows:

From 1.5 to 2 cc. of pantopaque or lipiodol were instilled into the lumbar subarachnoid space; then the patient was placed securely face down on a motor-driven tilt table equipped with a device for spot-film roentgenography, and the table was tilted according to the requirements of the fluoroscopic observations. As a rule, it was necessary to invert the patient to an angle of from 70 to 85 degrees for the oil to enter the upper thoracic and lower cervical regions. If the oil passed too rapidly, the table was returned promptly to the horizontal position until the proper rate of flow was obtained without entrance of the oil into the cisterna magna.

The myelographic appearance in the normal was established on the basis of a study of 8 patients who had myelographic examinations for other reasons than a lesion of the cervical spine and who had no symptoms or signs referable to the cervical region. It was noted that the opaque medium which had passed through the lumbar and lower dorsal spine as a solid column had a tendency to break up into droplets of various sizes as soon as it entered the cephalad third of the dorsal spine. When this happened, the patient was returned to the erect position to permit the oil to collect in the lumbar sac and the examination started anew. It was further observed that when the opaque medium finally entered the cervical spine as a solid column, there always was a transitory delay of the passage of the column through the lower three cervical vertebrae. Following this pause, the column usually extended to either side of the canal, outlining the axillary pouches as tiny triangular shadows with their apices directed laterally along the cervical nerves as they pass through the intervertebral foramina. By tilting the patient up and down several times, it was possible to collect most of the oil in the lower cervical canal.

The changes incident to herniation of the nucleus pulposus of the lower cervical spine were found to consist chiefly of alteration of the rate of flow and modification of the roentgen appearance of the solid opaque column. In 4 patients there was a definite partial obstruction to the passage of the column in the affected region which was fairly uniform and could be repeated in the same patient with identical results; in the fifth patient there was complete block of the cerebrospinal fluid. Serial spot roentgenograms made during the period of delay showed the opaque medium first gathered in a large globule with a flat or convex base simulating a caplike configuration, then a thin trickle of medium which passed from 2 to 5 cm. into one or both sides of the spinal canal, droplets being scattered beneath this and between the lateral ribbons. In the roentgenograms with the head downward, there was a characteristic inverted "U" or "L" appearance. In contrast with the normal, the oil did not enter the axillary pouches. When the obstruction was complete, the roentgen picture could not be distinguished from that observed in extramedullary tumors.

The 5 cases are described in short résumés. Several roentgenograms are reproduced for the purpose of illustration.

The general conclusion is reached that whereas routine roentgenographic and clinical examinations may lead to confusing results in the diagnosis of herniation of the nucleus pulposus of the lower cervical spine, myelography of the cervical canal constitutes a procedure which can provide valuable information and which, therefore, merits further careful study.

T. LEUCUTIA, M.D.

Long, L.: The Noninjection Method for Roentgenographic Visualization of the Internal Semilunar Cartilage. *Am. J. Roentg.*, 1944, 52: 269.

The correct diagnosis of injuries to the knee cartilage is of special importance in military medicine, where such a diagnosis eliminates a man from combat duty and usually from the service. Routine roentgenography of the knee is rarely helpful except in ruling out bone lesions and certain loose bodies.

There has been considerable literature concerning the roentgen demonstration of the semilunar cartilages by means of injections of the knee joint with gas or radiopaque solutions, but in military medicine these are considered operative procedures which may alter the line of duty on account of subsequent developments and therefore would not ordinarily be used as routine.

The author employs the noninjection method outlined by Reynolds in 1941 and in this article he publishes the results of a series of 709 examinations. The method is so simple that it is within the capabilities of a good technician.

The principle of the method is that an anteroposterior roentgenogram is made about three seconds after the end of a maneuver consisting of strong traction, firm internal rotation, and abduction of the fully extended leg. The thigh is held tightly against the table by a strong immobilization band, with a fixed, padded fulcrum against its lateral aspect just above the knee. To facilitate the easy adaptation of this fulcrum to either side of the table, the author constructed an accessory which he describes as follows: It consists of a piece of ¼ inch plywood about 2 feet long and of width sufficient to fit inside of the metal rails at the sides of the table top. If there are no rails on the table, a flange will have to be added to each side of the board to prevent sideplay. In the center, running lengthwise, is a 5 by 16 inch opening, and midway on one side of this is a padded fulcrum securely attached to the board. By simply turning the board end-for-end it may be used for either right or left knee.

The results of the examination are arranged in Table I.

The 15 cases of Group VII in which operation followed the roentgen study are arranged in another table according to the roentgen findings, operative findings, and the pathological report. In 13 of these (86.7 per cent) no cartilage shadow was present in the roentgenograms. Two revealed distinct cartilage shadows with a defect conforming to the "air replacement" shadow.

In 113 patients one or both knees were examined two or more times, with a total of 125 examinations in addition to the first one. The results of the re-examinations are given in a third table. Surprisingly, in a rather considerable number of cases in which the initial examination failed, the re-examination was successful. This is blamed partly on the lack of experience of the technician and partly on the failure of the patients to completely relax during the first examination. In any event, it is advisable to make a second or third examination whenever the cartilage does not appear to be definitely outlined at the initial examination.

The author presents some beautiful roentgenograms for the illustration of normal and various pathological semilunar cartilages. The negative shadow which appears as a result of the maneuver around the cartilage and which makes its visualization possible is the result of partial vacuum rather than of air.

The following general conclusions were arrived at by the author following this very minute and detailed study:

1. The technique of Reynolds for the visualization of the internal semilunar cartilage requires careful attention to small details for success and should not be attempted after a recent injury.

2. In normal asymptomatic knees, the cartilage was visualized in 67.2 per cent of the cases in the first attempt. Re-examination increased this percentage to 75.4 per cent.

3. In pathological conditions (mostly without surgical confirmation) the cartilage could be visualized in only 10.8 per cent of the cases, which indicated that nonvisualization is a corroborative sign. When an abnormal cartilage became visible, often a defect, thinning, or absence of its wedged shape was noted. Reynolds states that the cartilage cannot be demonstrated in the presence of effusion regardless of whether or not it is injured, and this was also the author's experience. Acute tenderness was, likewise, found to be a contraindication to the use of this method.

4. Improvement in accuracy of interpretation may be expected when a large series of surgically treated cases can be analyzed. For the present, it is best to interpret the roentgen findings in the light of the available clinical evidence.

T. LEUCUTIA, M.D.

TABLE I—RESULTS OF EXAMINATIONS

		Cartilage demonstrated	Cartilage not demonstrated	Totals
Group I	Normal, asymptomatic knees	191 (67.2%)	93 (32.8%)	284
Group II	Symptomatic knees with final diagnosis other than pathological cartilage	75 (60.4%)	49 (39.6%)	124
Group III	Clinical diagnosis of pathological cartilage without surgical follow-up	12* (17.0%)	58 (83.0%)	70
Group IV	Probable pathological cartilage but no definite diagnosis made	0	41 (100%)	41
Group V	Symptomatic knees with records not available for classification	18 (41.0%)	26 (59.0%)	44
Group VI	Previous knee operation elsewhere but no record as to the exact procedure	0	4 (100%)	4
Group VII	Pathological cartilage with operative confirmation	2** (13.3%)	13 (86.7%)	15

*Eight of these showed a defect or thinning of the internal portion.
**Both with a defect.

Ungar, E. M., Spiegler, G., and Smithers, D. W.: The Volume Localization of Deep-Seated Tumors by Means of Tomography. *Brit. J. Radiol.*, 1944, 17: 235.

In recent years more attention has been given to tumor dosages in roentgen therapy. The trend at present is not to consider the dosage at a given point within the neoplasm but to consider the tumor itself as a three-dimensional object with the rays entering into it from many fields.

The authors are concerned with reconstruction of the tumor in volume in its correct relationship to the body. It was found that tomography could be used for such a purpose. A description of the principle of tomography (sectional roentgenography) is given; an estimate was made concerning the magnification at each plane and a correction table established. In this manner, with multiple films at varying levels throughout the tumor, a model of the entire tumor could be reconstructed in its relationship to the body.

Tomography is a diagnostic field, and it is the responsibility of the diagnostic roentgenologist to render accurate interpretation of the tomograph and to co-operate with the therapist in an effort to administer the correct estimated tumor dose. However, it is pointed out that tomography is an adjunct to routine films and does not supplant them.

MAURICE D. SACHS, M.D.

Veloso, M.M.: Bronchial Cancer Treated with X-rays (Cancer bronquial tratado con rayos X). *Rev. méd. Chile*, 1944, 72: 616.

A case of bronchial cancer in which the patient is alive and free of recurrence five years after treatment is discussed. On admission to the hospital in November, 1938 the patient was forty-six years of age and weighed 60 kgm.; he was in good general health and had no past history except mild attacks of bronchitis in winter. He came for examination on account of a sudden intense pain in the left half of the thorax, cough without expectoration, dyspnea, and a temperature of 38°C. Clinical examination showed a pleural friction rub at the left base and relative dullness in the same region. Roentgen examination showed slight paralysis of the left diaphragm and veiling of the left costodiaphragmatic sinus. A diagnosis of pleurisy, probably tuberculous, was made and the patient sent to a tuberculosis sanitarium. Examinations for tuberculosis were negative, however, and he was discharged.

Ten weeks later he returned on account of pain in the precordial region and left half of the thorax, with cough, copious expectoration, sweating and chills, and a temperature of 38°C. He had lost seven kgm. in weight since the last examination. There was relative dullness of the left hilar region, with a murmur indicating a cavity; medium and low rales were heard. Roentgen examination showed a cavity containing liquid. The patient was hospitalized with a diagnosis of acute lung abscess, for which he was treated with small doses of neosalvarsan and intravenous injections of 20 per cent alcohol in glucose solution and 4 per cent emetin. His condition showed improvement but in order to confirm the decrease in the size of the abscess planigrams were taken. These planigrams, in addition to showing the disappearance of the cavity, showed decreased transparency of the left upper lung field and a slight constriction of the bronchus on that side. This suggested compression of the bronchus with atelectasis due to bronchial cancer. Roentgenograms with lipiodol showed obstruction of the left bronchus, and bronchoscopy showed a congested tumor which had the appearance of bronchial cancer. Histological examination of a biopsy specimen showed an anaplastic adenocarcinoma, evidently embryonic, with intense karyokinetic activity and, therefore, sensitive to irradiation.

Beginning July 18, 1939 a total dose of 7,500 international roentgen units was given in about three weeks; the factors were as follows: individual doses from 400 to 500 roentgen units; 200 kv.; 90 cm. focus-skin distance; and 300 sq. cm. of irradiated surface. With a filter of 1 mm. of copper and 0.8 mm. of aluminum, this gave a dose of about 2,300 international roentgens to the tumor.

The patient was dismissed without fever or pain, and weighing 54.1 kgm. There was scanty expectoration. Roentgenograms have been taken at intervals since then. The roentgenograms taken before and at various periods after treatment are given. The patient is in good condition.

AUDREY G. MORGAN, M.D.

MISCELLANEOUS

Hempelmann, L. A., Jr., Reinhard, E. H., Moore, C. V., Bierbaum, O. S., and Moore, S.: Hematologic Complications of Therapy with Radioactive Phosphorus. *J. Lab. Clin. M.*, 1944, 29: 1020.

One hundred sixteen patients with various types of hematologic dyscrasias have been treated with radioactive phosphorus at the Washington University School of Medicine, St. Louis, Missouri, and 100 of these have been observed for a sufficiently long period of time to permit evaluation of the therapy. Radioactive phosphorus is a valuable therapeutic agent in the management of polycythemia vera and the chronic forms of leucemia. Its use in patients with most acute leucemias, Hodgkin's disease, reticulum-cell sarcoma, and lymphosarcoma has been disappointing. The primary purpose of this communication is to call attention to the frequency with which anemia, leucopenia, and thrombocytopenia developed in the patients treated.

The appearance of toxic effects induced in the peripheral blood by radioactive phosphorus may be delayed for many weeks, presumably because with its half-life of fourteen and three-tenths days it continuously emits radiant energy for many weeks.

The authors used a freshly prepared solution, the initial activity of which usually varied between 300

and 400 microcuries per cubic centimeter. The solution was used during a period of weeks until its strength had decayed to between 30 and 50 microcuries per cubic centimeter. Small frequent intravenous injections of radioactive phosphorus were used. The size of each dose given parenterally varied between 100 and 2,000 microcuries. Patients were usually treated two or three times a week at first. As the white-blood-cell count either approached normal in the patients with leucemia or became subnormal in the cases without initial elevation of the leucocyte count, the dosage was decreased and the time interval between treatments was lengthened. Patients with polycythemia were given larger quantities of radioactive phosphorus at much less frequent intervals. Therapy was governed principally by the changes in the peripheral blood, and an attempt was made in each case to restore the cytology of the blood to as near normal as possible and to maintain this effect.

In the cases of lymphosarcoma, Hodgkin's disease, reticulum-cell sarcoma, multiple myeloma, and giant follicular lymphoblastoma, in which the white-blood-cell count was not elevated, regulation of therapy was more difficult. Administration of radioactive phosphorus was continued in these instances until changes in the peripheral blood gave warning of a depression of bone-marrow activity. In some patients serial bone-marrow aspirations were made to aid in regulating therapy. Patients with subleucemic leucemia were given amounts that were comparable with those required to regulate the subjects with elevated counts.

The most striking complication was the thrombocytopenia. The platelet count fell to below 100,000 per cubic millimeter in 44 instances and to below 50,000 in 33 of these. The fall in platelets frequently developed, in patients with leucemia, for instance, several weeks or months after the leucocyte count had approached normal and most of the abnormal cells had disappeared from the circulating blood. In some cases, thrombocytopenia occurred even after therapy had been discontinued. Of the 44 patients who developed thrombocytopenia, 38 showed clinical manifestations of abnormal bleeding.

In 56 patients there was a steady, progressive decrease in the leucocyte count; in 25 the white-blood-cell level first increased and then showed a progressive decrease; in 2 patients with acute leucemia there was a gradual rise in the number of leucocytes up to the time of death. Three patients who were in the terminal stages of leucemia first showed a decrease followed by a progressive increase. In the 14 others there was either no significant change in the leucocyte count or a pre-existing trend was apparently uninfluenced by therapy. Of the 41 patients who developed leucopenia apparently as the result of therapy, 6 had definite ulceration of the mouth or nasopharynx; the 35 others had no specific symptoms which could be attributed directly to the leucopenia.

Thirty-six of the 100 patients developed an anemia which seemed to be due to the therapy; this included only patients whose erythrocyte count dropped by 1,000,000 or more cells per cubic millimeter and to a level below 3,500,000.

At autopsy, localized areas of necrosis in the bone marrow were observed several times. In 4 instances, the bone marrow was found to be aplastic.

There was considerable variation in the susceptibility of different subjects to the toxic effects of radioactive phosphorus. In several instances, leucopenia, thrombocytopenia, or an anemia followed comparatively small doses of the material. Much larger amounts were tolerated by other patients without difficulty. The dosage must be individualized to a high degree. The blood of patients treated in this manner should be studied at frequent intervals so that the hematologic changes can be recognized early and further administration stopped before irreversible toxic effects on the bone marrow are produced. HAROLD C. OCHSNER, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Romano, J., Engel, G. L., Ferris, E. B., Jr., Ryder, H. W., and Others. Problems of Fatigue as Illustrated by Experiences in the Decompression Chamber. *War Med.*, Chic., 1944, 6: 102.

Fatigue studies on 43 adult subjects, repeatedly exposed to simulated altitudes of 35,000 feet in a decompression chamber, were carried out with clinical, psychological, and laboratory tests. Physical and chemical studies have been of little value in the understanding of fatigue in persons who are not subjected to severe muscular effort, or who are not deprived of adequate sleep. The problem of fatigue in flyers does not depend totally on physical stresses.

This study considers stresses other than muscular effort which contribute to fatigue, such as anxiety and individual emotional flexibility. Eight subjects were studied intensively, psychologically, and physiologically, before and after the six-month period of exposures. In addition to detailed personality analysis, attention was directed to the previous individual patterns of fatigue as related to different types of stress. Electroencephalographic studies were also made under varying conditions.

Three types of fatigue were observed. Muscular fatigue was most pronounced in the first or second flight and occurred in almost all subjects. It disappeared with training and was not related to decompression sickness. A second type of fatigue was related to boredom or ennui. This also tended to occur during flights without decompression sickness when the subjects remained inactive at altitude for long periods, and disappeared quickly after descent. The third type of fatigue was not related to either muscular work or boredom. It began sometimes immediately, but more often a few hours after descent, and tended to diminish in frequency and intensity with experience. It was experienced by 24 of the 43 subjects. The character of this fatigue was similar to that previously experienced in anxiety-stress situations and showed no direct correlation with decompression sickness in many instances. Physiological derangements could not be demonstrated quantitatively and objective evidence of such disturbances could be found in only a few instances after severe decompression sickness. Laboratory data, including the electroencephalogram, blood count, and circulatory reactions to changes in posture, revealed no direct correlation in any type of fatigue. While certain subjects experienced more pronounced fatigue after severe decompression sickness, others did not.

These data do not support the concept that "subclinical bends" accounts entirely for this type of fatigue. On the other hand, it is likely that the diffuse tissue damage which undoubtedly occurs in decompression sickness will, as in other types of tissue damage, lead to fatigue or augment and prolong the fatigue of emotional stress. The findings suggest that emotional factors play an important role in the production of the third type of fatigue. The importance of a more thorough understanding of the person who experiences fatigue is emphasized.

JOHN L. LINDQUIST, M.D.

Ficarra, B. J., and Naclerio, E. A.: The Physiochemical Disturbance in a Severe Burn. *Surgery*, 1944, 16: 529.

The most neglected phase of the burn problem has been the physiochemical disturbance produced by tissue destruction. The changes reflected in the circulating blood due to severe burns in a human being have been studied rarely. Most of the data have been gathered from animal experimentation. In the treatment of burns the opportunity and facilities were available on one occasion for a detailed and continual physiochemical observation of a severely burned patient. In view of the fact that few complete chemical analyses have been made in clinical burns, the following case report was considered significantly valuable:

A forty-three-year-old white male was burned when his clothing became inflamed from sparks which arose from the wire he was repairing. Tannic acid was applied to the body surface by members of the fire department and he was then taken to the hospital. The patient was in shock from burns involving 60 per cent of his body surface. There were third-degree burns of both thighs, second- and third-degree burns of the right arm and forearm, and first- and second-degree burns about both ankles. In addition, he had a fracture of the left ankle. At this time his temperature was 99.6°F., pulse 120, respirations 26, and blood pressure, 90/50.

Nine hours after admission the patient had responded sufficiently from shock to permit treatment of the burn. One hundred cubic centimeters of whole blood were taken for study immediately after entrance. For the first sixteen hours blood-chemistry studies were done every four hours. Thereafter complete studies were made every day. On the seventh postburn day the only available vessel for obtaining a blood sample was the internal jugular vein. This was due to the fact that the burn areas prevented the use of many vessels, others became thrombosed, and on that day the patient became edematous. On the ninth postentrance day the patient's temperature rose to 102°F., and he became delirious. Two days prior to this a toxic erythematous rash became visible on the nonburned skin surfaces. The patient expired on the tenth hospital day in spite of the general therapy with whole blood, plasma, fluids, adrenocortical extract, vitamins, chemotherapy, protein, and local treatment of the burn areas.

The anatomic findings at autopsy were as follows: primary diffuse third-degree burns of the head, chest, back, and upper and lower extremities; pyoderma with ulceration; bilateral acute and chronic interstitial pyelonephritis and nephrosis; bilateral adrenal hemorrhage; passive congestion of the liver; hemorrhagic cystitis; acute tracheitis; ulcerative esophagitis; mucosal hemorrhage throughout the gastrointestinal tract; cardiac hypertrophy with right ventricular dilation; pulmonary edema; and chronic cholecystitis with calculi.

The significant pathological findings were revealed in the study of the skin, kidneys, liver, and adrenal glands. Among these four organs the most interesting findings were noticed in the kidneys.

Grossly the kidneys were extremely large; the right one weighed 470 gm. and the left, 380 gm. The capsule was thin and stripped easily. The underlying cortical surface was reddish brown in color with readily demarcated cortex and medulla. The glomeruli were grossly prominent. Microscopic examination of the kidneys demonstrated that the glomerular spaces were distended with albuminous deposits. The cytoplasm of the tubular epithelium had a ground-glass appearance, especially in the proximal convoluted tubules. Many tubules contained albuminous material. A marked interstitial edema with scattered localized areas of hemorrhage was present. The renal pelvis, medulla, and isolated cortical regions showed dense collections of lymphocytes, plasma cells, and fibrin. The capillaries showed pronounced dilatation and engorgement.

Pathological histology of the liver showed a generalized dilatation and engorgement of the sinusoids. The liver cells indicated passive congestion. Lymphocytic nests with occasional polymorphonuclears were seen about the portal region.

The adrenal glands retained their normal histology. However, the zona reticularis of the medulla contained hemorrhagic areas. The cells had a coarse ground-glass appearance. Marked interstitial edema was seen in all the zones of the medulla.

It has been generally accepted that in extensive burns a toxic state results because of injurious elements produced by burned tissues. The quantity of liberated toxic substances which pass into the circulation is believed to be proportional to the extent of the burn. The exact nature of this toxic substance has never been determined. Formerly it was thought to be derived from the albumin of the cell and was suspected of being a polypeptide. Death was attributed to toxic physiopathological alterations in the internal organs due to this proteid substance.

From their experience with burns the authors believe that the question cannot be answered simply by stating that toxicity is the cause of physiologic dysfunction. Heretofore, minimal consideration has been given to the physiochemical changes in burns. In 1924 Davidson studied intensively the sodium-chloride metabolism in burns. This was the first time that an evaluation of the blood chemistry found a prominent place in the discussion of burns. He found a significant lowering of the chlorides, which was believed to be due to a lowering of the plasma chlorides below the renal threshold rather than to a primary kidney change. It was further observed by him that the chlorides did not fall immediately after the burn, but diminished progressively during the first few days.

Fox, in a recent publication, has stressed the importance of sodium in the rational treatment of the burned patient. Hypoproteinemia, destruction of body protein, alterations in carbohydrate metabolism, hemoconcentration, and acidosis have been noted and discussed by many observers.

The major concern in the treatment of burn shock is the administration of intravenous fluids that will restore the blood volume and its physiologic components to nearly normal level. The preference for plasma is based upon the fact that extensive burns are followed by exemia and cellular concentration of the blood. Harkins devised a simple method of calculating plasma dosage. His formula is to give 100 cc. of plasma for every point the hematocrit is above the normal of 45[2].

The authors' case has emphasized that the intelligent management of the severely burned patient demands daily biochemical diagnostic studies. The facility with which an altered physiochemical state occurs merits constant checking of the blood chemistry. Therefore, it can be stated that biochemical determinations are equally as important as therapeusis and the definitive treatment of the severely burned.

The authors found that the analysis of the metabolic and chemical data in this fatal burn case illustrated sodium chloride changes, hypoproteinemia, destruction of body protein, alterations in the carbohydrate metabolism, and hemoconcentration.

The acidosis which usually accompanies the burn syndrome was absent. An unexpected alkalosis occurred following the administration of citrocarbonate on the fifth postburn day.

Emphasis is placed upon a study of the blood chemistry on or about the fifth day. At this time a break in the biochemical harmony occurs. This discord is manifested by an elevation of the end-products of nitrogen metabolism associated with a fall in serum proteins, plasma sodium, and blood chlorides.

In the treatment of this patient, 16,200 cc. of fluid were administered parenterally. Of this amount, 6,900 cc. were plasma and 3,100 cc. were whole blood.

Death on the tenth day was attributed to adrenal exhaustion and renal failure. The major factor leading to the cause of death in burns has not been established satisfactorily. It is believed that a severely burned patient dies of physiologic exhaustion. Therefore, a study of the organs involved in this disturbed physiology (liver, kidneys, and adrenals) will assist in the elucidation of the problem of the unknown lethal factor.

Herein lies the intrinsic value of serial studies of the physiochemical changes in the burned body as

reflected in altered blood chemistry. The exhaustion of the aforementioned basic physiologic organs may be the cause of death when, after the second week, the patient seems to be improving.

This somatic distress is emphasized because during the third week the initial danger apparently has been overcome. The anxious surgeon considers the patient sufficiently improved for a skin graft. However, the disturbed chemistry has not been restored. In the presence of this metabolic discord, the administration of an anesthetic plus the surgical procedure may be sufficient to cause death.

BENJAMIN GOLDMAN, M.D.

Taylor, F. H. L., Levenson, D. M., and Adams, M. A.: Abnormal Carbohydrate Metabolism in Human Thermal Burns. *N. England J. M.*, 1944, 231: 437.

In a study of 35 consecutive burned patients, a high incidence of hyperglycemia, lactacidemia, and a moderate reduction in the carbon dioxide-combining power of the plasma were found. There is a high degree of correlation between these abnormalities of carbohydrate metabolism and the severity of the burn. The glucose-tolerance tests made indicate that in some severely burned patients with hyperglycemia there remains a considerable ability to metabolize added glucose.

There was no evidence of liver damage in these patients as a result of the burn. In the few cases in which liver damage was found, it was present before the injury, being for the most part an alcoholic cirrhosis.

The abnormalities in carbohydrate metabolism presented are not inconsistent with the presence of an increased glycogenolysis, together with a possible gluconeogenesis from protein. It is suggested that additional glucose be given early to burned patients.

SAMUEL KAHN, M.D.

Jones, G. M.: Diabetes Insipidus; Clinical Observations in 42 Cases. *Arch. Int. M.*, 1944, 74: 81.

Diabetes insipidus is a syndrome produced by damage to the supraopticohypophysial tract, and is not a specific etiological entity. This fact is too little recognized by the medical profession in general. A historical summary of the experimental and clinical contributions which lead to the present knowledge and concepts of diabetes insipidus is presented, and an analysis of 42 cases is made. The causes of the diabetes insipidus in these cases are listed in Table I.

TABLE I.—CAUSES OF DIABETES INSIPIDUS

	No. of cases	Percentage
Tumor of pituitary gland	11	26
Tumor of hypothalamus	2	5
Hand-Schuller-Christian disease	4	10
Chronic encephalitis	7	16.6
Syphilis	3	7
Post-traumatic injury to the head	3	7
Pituitary infarction (?)	1	2.4
Cerebrovascular accident	1	2.4
Subarachnoid hemorrhage	1	2.4
Hypothalamic damage, cause unknown	1	2.4
Undetermined cause	8	19
Total	42	100

One of the striking features of the cases studied was the early age of onset of the diabetes insipidus. Any patient with symptoms of diabetes insipidus deserves the most careful study in an attempt to determine the specific pathological changes that are responsible for the symptoms. The term "idiopathic" diabetes insipidus merely indicates that the pathological cause was undetermined before death, or that the polydipsia and polyuria had a possible psychic origin. The latter possibility can be eliminated by a prolonged urine-concentration test, since the polyuria is primary and the polydipsia secondary, and the patient with true diabetes insipidus will continue to have a large volume of urine of low specific gravity, with resultant dehydration and loss of weight during such a test. In any case in which such a response is obtained, the diagnosis of organic damage along the supraopticohypophysial tract should be made. Furthermore, since diabetes insipidus is not infrequently the first symptom in cases of neoplasm (occurring as early as six years before other evidence of the malignant growth in one of the cases reported here), roentgen irradiation of the hypothalamicohypophysial region may be worth while when the cause of the diabetes is undetermined. Roentgen irradiation is also of value in Hand-Schuller-Christian disease. For patients with diabetes insipidus who do not respond to therapy as specifically indicated by the etiological factor, substitution of the antidiuretic principle in the form of a solution of extract of the posterior lobe of the pituitary gland or pitressin affords notable symptomatic relief. Of the various methods of administration of this extract as replacement therapy in the absence of the antidiuretic principle, the intramuscular injection of pitressin tannate in oil seems the most desirable. The intranasal application of pitressin in jelly was the least satisfactory of the methods tried in this series. The use of a low salt as an adjunct to other therapy may be of benefit in any case of diabetes insipidus. Thyroidectomy should not be performed for diabetes insipidus unless there are other specific indications for the procedure.

JOHN L. LINDQUIST, M.D.

Free, A. H., and Leonards, J. R.: Studies on the Ingestion of Large Quantities of Protein and Amino Acids. *J. Lab. Clin. M.*, 1944, 29: 963.

Studies are reported in 2 normal human subjects in whom comparable massive amounts of whole blood protein, muscle meat, and amino-acid mixture were ingested over an eight-hour period. Studies of the blood urea, blood amino acids, urinary urea excretion, and urea clearances were carried out.

The limiting factor in determining the amount of protein or amino-acid mixture that can be ingested appears to be the rate of intestinal absorption. Large amounts of unhydrolyzed protein are more

rapidly handled by the normal gastrointestinal tract than are equivalent amounts of amino acids. It seems questionable, therefore, whether amino acids have any advantage in alimentation over unhydrolyzed dietary protein, especially when large amounts are administered and when pancreatic proteinases are present in adequate amounts. After the ingestion of the two proteins and the amino-acid mixture the variations in the blood levels of urea nitrogen and amino-acid nitrogen were similar.

Maximum urea clearances, as well as urinary urea excretion, were increased after the consumption of amino acids and proteins. The extent of gastrointestinal hemorrhage can be more accurately evaluated by urine and blood-urea determinations than by blood studies alone. WALTER H. NADLER, M.D.

Wallace, D. H., and Adler-Tanz, P.: A Study of Vitamin C Saturation in Hospital Children. *Glasgow M. J.*, 1944, 142: 55.

Vitamin C saturation tests performed on 848 children admitted to the wards of the Royal Hospital for Sick Children during the period from October, 1940 to June, 1944, showed defective vitamin C nutrition in a high proportion of the children. This was most severe in the year from October, 1941 to September, 1942, when, because of war conditions, vitamin C in the diet was at its lowest.

Since febrile illnesses reduce vitamin C reserves, precautions should be taken in the medical wards of children's hospitals to ensure that ample vitamin C in one form or another is given to all the patients.

The children, most of whom came from the slum districts of Glasgow, showed subnormal vitamin C saturation when compared with children living under good conditions. The deficiency was especially noticeable in the year when the dietary sources of the vitamin were at their lowest. It is thought that the low vitamin C saturation found in the children admitted to the hospital was partly due to the fact that many of them were suffering or recovering from various acute infections such as pneumonia or gastroenteritis.

The influence of infection in lowering the vitamin C reserves was evidenced by comparison with patients from the same social class who were admitted to the surgical wards of the hospital but who were suffering from noninfective conditions.

Frank scurvy was rare, and this suggests that optimal saturation is not necessary for average health. When repeated test doses of the vitamin were given, a high proportion of the children who were unsaturated when first tested showed suboptimal saturation within three days. Most of those who took longer to become saturated were suffering either from scurvy, infection, or some nutritional disorder in which there is interference with absorption from the bowel. While full saturation may not be necessary for the maintenance of health, it appears that children living in slums, where acute infections are so prevalent, should have ample supplies of vitamin C, because with the onset of infection their reserves become exhausted. STEPHEN A. ZIEMAN, M.D.

Powers, J. H.: The Abuse of Rest as a Therapeutic Measure in Surgery. *J. Am. M. Ass.*, 1944, 125: 1079.

The author notes that rest, as a therapeutic measure, is fraught with hazard. Prolonged periods of recumbency in bed are anatomically, physiologically, and psychologically unsound and unscientific. Surgical wounds heal firmly even though early postoperative activity is encouraged. Infants and young children cannot be kept quietly at rest in bed after operation, yet postoperative hernias are not common.

The author presents 100 consecutive patients who were allowed to sit in a chair and to walk on the first day after major operations and compares these studies with similar observations on an equal number of consecutive, unselected patients who remained in bed for the traditional period of from ten to fifteen days.

The operations performed were as follows: hernioplasty for inguinal, femoral, umbilical, epigastric, and incisional hernias; appendectomy for acute appendicitis, including cases of perforation with abscess and peritonitis; cholecystectomy with and without exploration and drainage of the common duct; and hysterectomy and other major pelvic operations performed through an abdominal incision. The patients in both groups were all over twelve years of age.

Of the patients who underwent hernioplasty, 39 were up and walking on the first day after operation and an equal number remained in bed from twelve to fourteen days. Those who were permitted early activity spent an average of nine and one-tenth days in the hospital and required five and six-tenths weeks for convalescence, while the other group remained in the hospital fifteen and two-tenths days and did not return to work until ten weeks after operation. No recurrences developed among those who were up on the first postoperative day while 1 inguinal and 1 femoral hernia recurred among the recumbent patients.

Of the patients with acute appendicitis, 22 from each group were observed. Those who were activated promptly returned to work in four and eight-tenths weeks, while those who remained in bed the customary time did not resume their work until eight and seven-tenths weeks after operation. There were no postoperative residual intraperitoneal abscesses that developed in the patients who were ambulatory early; in the other group, 2 such abscesses developed.

Of the patients who underwent cholecystectomy, 14 from each group were observed. One in the ambulatory group developed a late incisional hernia subsequent to discharge from the hospital, while 2 such hernias occurred in the patients who remained in bed sixteen and twenty days after operation, respectively. The convalescence in the hospital was materially shortened and the total average period of rehabilitation was reduced one half by early postoperative activity.

Twenty-five patients of each group were observed after abdominopelvic surgery. Supravaginal hysterectomy was performed 10 times in the ambulatory group, while it was performed only 8 times in the other group. Only 1 person was allowed up on the first day after repair of a cystocele, rectocele, and prolapse. The average age of the patients in the early and control series was almost exactly the same. The length of time spent in the hospital after operation and the total period of convalescence for the patients who were allowed early activity were eleven and seven-tenths days and six and seven-tenths weeks, respectively; for those whose regimen followed the earlier pattern, the averages were sixteen and seven-tenths days and eleven and six-tenths weeks, respectively.

Of 100 patients observed in each group, the ambulatory patients spent ten and three-tenths days in the hospital, while those who followed the traditional convalescent program averaged sixteen and one-tenth days in the hospital. This represents a saving of 580 hospital bed days. If the temperature and pulse rate are regarded as accurate indexes of convalescence, such early activity is in no way deleterious. However, other complications may arise.

Postoperative complications may be classified as local, pulmonary, cardiac, vascular, genitourinary, gastrointestinal, and general. No local complications of major significance occurred because of early activity. No wounds disrupted. One incisional hernia developed several months after operation, an incidence of 1 per cent. Two incisional hernias, 2 recurrent hernias, 1 hematoma, and 1 silk sinus occurred among the patients who were kept recumbent for the customary postoperative periods. Serious pulmonary complications were likewise more common among the patients who remained in bed. No cardiac complications were observed among the ambulatory patients. The incidence of vascular complications was reduced but not eliminated. Postoperative inhibition of the bladder was rather common in both groups. Repeated catheterizations were much more frequent among the patients whose convalescence was spent in bed. Postoperative dilatation of the stomach and fecal impactions occurred only in the patients who remained in bed. Fever which could not be explained by reaction to operation or to the disease was observed in 5 patients among the recumbent group. In total, there were 17 postoperative complications among the 100 patients who were out of bed on the first day, and 46 among the same number in the unselected control group.

Accurate reapproximation of the tissues is compulsory, if early activity is planned. Nonabsorbable, interrupted sutures are preferred except in the peritoneum, which may be closed with a continuous stitch. Additional supporting sutures of silkworm gut or silver wire may be desirable for obese patients or in the presence of infection.

In conclusion, the author notes that early postoperative walking may reasonably be of definite therapeutic value in the prevention of pulmonary complications. Elevation of the diaphragm in the recumbent position, pooling of the tracheobronchial secretions in the finer ramifications of the bronchial tree, the patient's disinclination to cough because of pain, the limitation of maximal respiratory excursions, and the invariable reduction in the vital capacity after laparotomy or hernioplasty all play some role in the etiology of postoperative atelectasis and pneumonia. The volume of the tidal air, tension of the oxygen in the alveolar spaces, oxygen saturation of the arterial blood, and the depth and rate of respiratory movements are increased by exercise.

The occurrence of 1 case of ileofemoral thrombophlebitis and 1 of suspected thrombosis in the deep veins of the leg among the ambulatory patients indicates that early postoperative walking does not entirely circumvent the formation of thrombi; it may obviate the liberation of emboli of sufficient size to precipitate a fatal postoperative catastrophe. A thrombus of this magnitude does not usually develop in an active venous circulation.

Postoperative dysfunction of the gastrointestinal tract is uncommon when early convalescent activity is permitted. Abdominal distention is rare. Enemas, rectal tubes, and poultices are seldom necessary. A regular diet can usually be accepted on the fourth or fifth postoperative day.

The absence of asthenia in ambulatory patients is impressive; demineralization of the bones and atrophy of the muscles, so common after prolonged periods of rest in bed, are entirely obviated.

Contrary to the opinion of the majority of surgeons, those who have advocated early postoperative walking have observed no deleterious effect as a result thereof, no increase in pain, and no greater frequency of disruption or hernia.

The improvement in morale is striking. Early discharge from the hospital effects an economy for the patient and an efficient utilization of beds by the institution. Prompt rehabilitation insures a minimal loss of time from work and the early re-establishment of normal activity.

HERBERT F. THURSTON, M.D.

Raven, R. W.: The Surgical Complications of Typhus Fever. *J. R. Army M. Corps.*, 1944, 83: 119.

The author witnessed several interesting complications of typhus fever among the Arabs of North Africa and ascertained that a racial resistance to this disease existed. Thus it was noted that the Russians have a high resistance, the French a moderate one and the Rumanians a low resistance with a corresponding incidence in surgical and suppurative complications.

The surgical complications of typhus fever may be classified into 3 groups: infective, vascular, and ocular. Infective complications are usually manifested by abscess formation in the cephalocervical region, the extremities, the chest, the abdomen, or the perineum. Cellulitis is usually a fatal complica-

tion, and 6 such complications resulted in 100 per cent mortality. Acute parotitis was reported in 48 cases. Treatment consisted of one or more small incisions over the most prominent site of fluctuation. Pus may or may not appear, but the diminution of intracapsular pressure is of value. Instead of surgery, x-ray therapy over the parotid gland, especially in the nonpurulent infections, may be used as a substitute.

Other reported complications include inflammation of the buccal cavity, mandible, larynx, bones, and joints. Vascular complications occur in large numbers. These include phlebitis, and gangrene of the extremities, of the intestine, and of the skin. Gangrene of the extremities is usually of the dry type and occurs during the first weeks of convalescence. It is probably caused by a progressive obliteration of the blood capillaries and arterioles, commencing in the distal part of the limb. Cutaneous gangrene may occur in the skin of the scrotum, of the extremities, and at pressure points. Ocular complications are manifested by thrombophlebitis of the orbital veins, atrophy of the optic nerve, corneal ulceration, or paralysis of the third and sixth nerves. The possibility of surgical complications should be borne in mind by the attending physician, and treatment instituted early. BENJAMIN G. P. SHAFIROFF, M.D.

GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

Dowdy, A. H., Sewell, R. L., and Vincent, J. G.: The Prophylaxis and Therapeusis of Clostridial Infections (Gas Gangrene). *N. York State J. M.*, 1944, 44: 1890.

The authors have studied over 1,500 dogs in which clostridial infections have been produced. The report is confined to the sulfonamides, penicillin, and pentavalent antitoxin as far as treatment is concerned. Of the 377 untreated control dogs, 93.4 per cent died. The infectious agents were virulent cultures of the clostridia perfringens, septicum, novyi (2 strains) and sordellii. Mixed cultures of the inocula produced a great increase in virulence and the amount of injection had to be reduced. The presence of staphylococcus aureus was found not to be responsible for the increase in virulence of the inocula.

The drugs employed for prophylaxis were sulfadiazine, sulfathiazole, sulfanilamide, and penicillin. The blood levels of the different agents were determined before, during, and after administration. Sulfathiazole was the most difficult to maintain at the desired levels. A three-day treatment period was followed by seven days of observation.

With the clostridium perfringens there was a 12 per cent survival of the controls. With the clostridium septicum there were no survivals. With one strain of the clostridium novyi there was a 4 per cent survival, and with the second strain there was none. There was a 12 per cent survival with the clostridium sordellii. With the 5 strains mixed there was a 6.6 per cent survival.

Sulfadiazine was the most effective prophylactic with 92 per cent survival in infections caused by the clostridia perfringens, 72 per cent survival in those caused by clostridium septicum, 80 per cent in those caused by clostridium sordellii, but only 4 per cent in those caused by clostridium novyi.

Sulfathiazole was next in effectiveness and then sulfanilamide. The clostridium novyi proved extremely resistant to the action of the sulfonamides. The prophylactic experiment in which 7 dogs were treated with penicillin against the clostridium novyi showed a 72.4 per cent survival.

Therapeutically, the experiments were carried on against 7 infectious agents except in the case of the sulfonamide-resistant clostridium novyi. Sodium sulfadiazine, penicillin, and pentavalent gas-gangrene antitoxin, or a combination of these agents were used. Auxiliary sulfadiazine was used as this would act directly on the invading organisms when antitoxin was the definitive agent. In order to simulate battlefield conditions more closely, the wounded should have received the prophylactic treatment with sulfonamides before they reached the base hospital for the definitive treatment.

The dosage of penicillin for a treatment was from 23,200 to 26,000 units per kilo of body weight. Massive doses of antitoxin over a short period of time were deemed preferable. The results showed that with sodium sulfadiazine used individually as the therapeutic agent against the mixed infection of clostridia perfringens, septicum, sordellii, and staphylococcus aureus, there was a 48 per cent survival as compared to a 6.6 per cent survival in the control group. Against the same infection, when penicillin was used, there was a 100 per cent survival. Penicillin was used for therapeusis only with sodium sulfadiazine as the auxiliary agent. When penicillin only was used three hours after inoculation, 25 dogs showed a 100 per cent survival. When it was used six hours after inoculation along with sulfadiazine there was an 88 per cent survival. When it was used twelve hours after inoculation along with sodium sulfadiazine there was only 8.3 per cent survival, and when it was used with sulfadiazine three hours after inoculation there was 100 per cent survival.

Penicillin was used alone twelve hours after inoculation with no survivals. The antitoxin-penicillin combination was apparently the best treatment in the advanced stages of the infection.

The survival rates are higher for the sulfadiazine-treated animals than for the sulfathiazole-treated animals. In prophylaxis, sulfadiazine is the best of the three sulfonamides employed, when it is given systemically in such amounts as to maintain an adequate blood level. When the contaminating organism is the clostridium novyi, little or no protection can be expected from any of the three sulfonamides studied. Penicillin is of little value for prophylactic treatment and could not be used routinely under battle conditions. The authors did not test the prophylactic use of the pentavalent antitoxin.

Therapeutically, when gas gangrene is apparent clinically, sulfadiazine should be expected to be 50 per cent effective. It is suggested that it might be best to give the initial dose intravenously in the form of sodium sulfadiazine in order to obtain therapeutic concentration of the drug in the blood. Penicillin is much superior to sulfadiazine as a therapeutic agent as it is effective against the clostridium novyi as well as the other three clostridial organisms.

Penicillin should be extremely valuable early in the disease but it becomes less valuable as toxicity progresses. Pentavalent gas-gangrene antitoxin, when used in large amounts and given early, is very effective. In patients in whom the condition was far advanced and toxic the last agent was the only method found to be effective and, if supplemented by sulfadiazine or penicillin, it became very effective. The total amount as determined should be administered within eight hours at intervals of not more than two hours.

Clinically, the patient should be tested for sensitivity to the antitoxin and, if sensitive, carefully desensitized. Sulfadiazine or penicillin may be used during this desensitizing period.

Experimentally, no contraindications were found to the combination of all three of these drugs.

It was suggested that surgical amputation should be indicated by the state of the vascular bed and not by the infection. RICHARD J. BENNETT, JR., M.D.

Quill, L. M., and Burch, J. C.: Surgical Manifestations of Coccidioidomycosis. *Ann. Surg.*, 1944, 120: 670.

Coccidioidomycosis occurs in 2 forms, localized and disseminated. The primary or localized form has been referred to as San Joaquin fever, Valley fever, and desert rheumatism. It is endemic in certain arid regions of the Southwest. The causative organism has been shown to be a fungus. There are 2 phases in its life cycle, a vegetative and a parasitic. In tissue, the organisms appear as double-contoured spherules of variable size, containing endospores. The appearance of these spherules is characteristic, and their presence is diagnostic of the disease. Microscopically, the growth is composed of interlacing mycelia with tiny chlamydospores attached to the aerial hyphae. Infection in the primary form is the result of inhalation or, rarely, inoculation of the chlamydospores which have grown out on the soil. It is unlikely that the disease can become established in new areas by the migration of infected persons. Man to man contact transmission is unknown. The parasitic spherule is not very infectious, and must first grow as the vegetative form. It is pointless to isolate patients with the disease, but care should be taken in the disposal of sputa and dressings.

The secondary form, or coccidioidal granuloma, is much rarer. It occurs about once in every 300 or 400 primary cases. It is due to a failure of the host to localize, or keep localized, the primary infection. Development of the granulomatous form usually occurs quickly, but occasionally the interval may be years.

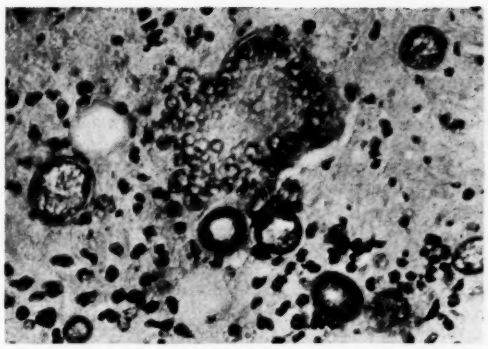


Fig. 1. Coccidioides immitis. Photomicrogram of the organism in tissue. (Courtesy of J. B. Lippincott Co.)

The primary infection is commonly accompanied by signs and symptoms of a mild respiratory infection, usually bronchitis, with a productive cough. There may be chills, fever, anorexia, malaise, backache, and joint pains. Within the first eighteen days, erythema nodosum appears in 2 to 15 per cent of the cases. The leucocyte count is variable. Eosinophilia occurs late fairly regularly in the disease. The sedimentation rate is elevated. The sputum contains the diagnostic spherules during the active stage. If not found, the sputum may be cultured. X-rays may reveal only transient changes in the lungs. Exudative lesions may be associated with cavitation. The cavities are usually single, and have a tendency to persist. Cavitation is the only lesion of surgical interest occurring in the primary phase.

Once the primary infection has been localized, a high degree of immunity develops. Patients react to an extract of the organism somewhat as to tuberculin. This coccidioidin test depends on a skin sensitivity to a polysaccharide substance combined with a nitrogenous radical, and is an allergic manifestation. The usual dilutions used are 1:1000 and 1:100. The test is read at twenty-four, forty-eight, and seventy-two hours. It is relatively disease-specific. There is also a complement fixation test and a precipitin reaction.

When the infection is overwhelming, or the resistance inadequate, dissemination occurs. Any tissue of the body can be involved, except the gastrointestinal tract. The individual lesions are usually granulomatous cold abscesses. A variety of surgical conditions can thus be simulated. Several cases are reported to illustrate the clinical similarity of coccidioidal granuloma and certain common surgical conditions, such as appendicitis, Pott's disease of the spine, and pneumonia. Cases simulating cord tumor, cerebellar abscess, and peritonitis, have been reported.

The prognosis is grave. In coccidioidal granuloma, surgical removal, if possible, is probably the procedure of choice. Drugs, such as colloidal copper, tartar emetic, iodides, sulfonamides, and penicillin have been found to be ineffective. Recently, immune transfusions have been used with beneficial results in some instances. The pulmonary cavities are best treated conservatively. If hemoptysis is severe, pneumothorax has given good results.

SAMUEL KAHN, M.D.

DUCTLESS GLANDS

Kahn, J., and Stock, R. P.: Fatal Agranulocytosis Resulting from Thiouracil. *J. Am. M. Ass.*, 1944, 126: 358.

Leucopenia and granulocytopenia have been reported as potential dangers in the use of thiouracil when given to thyrotoxic human beings. Similar observations have been made on adult rats which were fed thiourea. A white woman, age sixty-two, was admitted to the hospital because of nausea, drowsiness, and vomiting of six hours' duration. She was known to have had diabetes for six years and to have been negligent both in taking insulin and in following the prescribed diet. Diffuse goiter of relatively mild toxicity had been present for about ten years. On this admission to the hospital the patient was in impending diabetic coma. The response to therapy directed against acidosis was prompt. Because of the unstable nature of her diabetes, wholly satisfactory control never was possible.

As soon as possible after diabetic acidosis had been corrected, evaluation of the patient's thyrotoxicosis was made. Exophthalmos was slight. A fine tremor of the hands was present. A labile pulse varied between 100 and 120 pulsations per minute. The basal metabolic rate on the eleventh day was plus 65 per cent on two determinations. Blood cholesterol was 164 mgm. per 100 cc.

Thiouracil was started with an initial dose of 0.8 gm. per day in 4 divided doses for two days. Thereafter the amount was dropped to 0.6 gm. per day in 3 divided doses. A favorable response to thiouracil was prompt. The basal metabolic rate had dropped in fourteen days to plus 42 per cent. The patient had gained 4 lb. and the pulse rate was 80 per minute. The response to thiouracil continued to be favorable with a gradual rise in body weight and progressive lowering of the basal metabolic rate.

On the forty-fourth day of medication with thiouracil the basal metabolic rate was plus 10 per cent and the pulse stable at 80 pulsations per minute. At this time the dosage of thiouracil was reduced to 0.4 gm. per day. Seven days later the patient suddenly complained of a swollen, dry throat and within twenty-four hours her rectal temperature rose to 105 degrees. The erythrocyte count at this time was 3,650,000 and the leucocyte count had fallen to 1,100 per cubic millimeter with 2 per cent neutrophils, 1 per cent eosinophils, and 97 per cent lymphocytes. Thiouracil was stopped immediately. A total of 30.8 gm. of thiouracil had been given over a period of fifty-four days preceding the clinical development of agranulocytosis.

The patient died five days after the appearance of agranulocytosis. At autopsy the bone marrow of several ribs and bodies of the vertebrae was abundant and dark red. Microscopically, the cells of the granulopoietic series appeared to be greatly reduced in number. The clinical diagnosis of both diabetes mellitus and toxic diffuse goiter was supported by the anatomic findings. Death in this case was doubtless due to the agranulocytosis with its subsequent agranulocytic angina. HAROLD C. OCHSNER, M.D.

Frame, E. G., Fleischmann, W., and Wilkins, L.: The Influence of a Number of Androgenic Steroids on the Urinary Excretion of Neutral 17-Ketosteroids. *Bull. Johns Hopkins Hosp.*, 1944, 75: 95.

The authors' study confirms the results of previous investigators on the effects on 17-ketosteroid excretion of the administration of different androgenic steroids, and presents the results of the administration of 4 additional steroids which have not hitherto been reported. The use of dwarfed, sexually retarded boys, with very low urinary 17-ketosteroids before treatment, as subjects affords certain advantages in that the possible complication of obscuring the effect of steroid administration by lowering the body's production of 17-ketosteroids is reduced to a minimum.

Eleven different steroids having an androstane or androstene nucleus were administered to sexually underdeveloped dwarfed boys ranging in age from nine to eighteen years and the effects on the neutral 17-ketosteroid excretion were determined.

The administration of the following compounds was accompanied by a significantly increased excretion of 17-ketosteroids:testesterone (free or propionate); androsterone; dehydroisoandrosterone; Δ 4-androstenedione-(3,17); Δ5 androstenediol-(3B,17a) -diacetate; and androstanediol-(3a,17a)-diacetate.

The authors conclude that for this reason the 17-alkyl androgenic steroids are valuable agents in the study of the effects of androgen administration on the endogenous production of urinary 17-ketosteroids.

JOSEPH K. NARAT, M.D.

SURGICAL PATHOLOGY AND DIAGNOSIS

Symmers, D.: Clinical Significance of the Deeper Anatomic Changes in Lymphoid Diseases. *Arch. Int. M.*, 1944, 74: 163.

Anatomically, chronic lymphogenous leucemia is broadly divisible into two forms, a splenomegalic form, in which lymphoid hyperplasia is preponderant or "primary" in the spleen, and a form in which the abdominal lymph nodes or the abdominal and thoracic nodes combined are preponderantly or "primarily" enlarged. In both forms, enlargement of the superficial nodes, if it occurs at all, is secondary. The same statement applies to Hodgkin's disease,

with the addition that in this disease there is a form that is preponderant or "primary" in the thymus, and one that is preponderant or "primary" in the liver. In giant follicular lymphadenopathy the preponderant or "primary" changes are most often in the lymph nodes of the abdomen. It is probable that there is a preponderant or "primary" splenomegalic form, but proof of this awaits confirmation by evidence adduced at necropsy. In the majority of all cases of lymphosarcoma (70 per cent) the preponderant changes are in the gastrointestinal tract, in the thymus, or in the abdominal or the thoracic lymph nodes; rarely, in the spleen. Enlargement of the superficial lymph nodes, if it occurs at all, is usually a later and secondary feature. The gastrointestinal so-called "pseudoleucemia" of Briquet, as its name implies, is preponderantly or "primarily" a disease of the lymphoid tissues of the gastrointestinal tract. Splenomegaly and enlargement of the superficial and deep lymph nodes, while almost constantly present, are secondary features. The distribution of the lesions in the lymph nodes of the thorax and abdomen seems to warrant the view that the causative agent of each of the lymphoid diseases enters through mucous membranes, most often through the mucous membrane of the gastrointestinal tract. In other circumstances, it appears that the causative agent filters through both the mucosal follicles and the lymph nodes in the abdomen and chest, and eventually brings about hyperplastic changes in the follicles of the spleen, in the thymus or its remains, or in the auxiliary lymphoid foci scattered through the interstitial tissues of various organs.

Stemmerman, M. G., and Auerbach, O.: The Value and Limitations of the Congo-Red Test for Amyloidosis. *Am. J. M. Sc.*, 1944, 208: 305.

The results of 649 Congo-red tests for amyloidosis performed on 446 patients have been reviewed in order to evaluate the test and to determine the sources of error. It has proved to be a valuable procedure, in spite of a certain proportion of erroneous results, which in the authors' series has been calculated as 24.3 per cent of false negatives and 4.2 per cent of false positives.

The presence of only minimal amounts of amyloid is the principal reason for false negative results, while technical errors are probably the chief cause of false positive reports.

The determination of the presence of Congo red in the urine within one hour after injection of the dye has been of little value in the diagnosis of amyloid nephrosis. HAROLD C. OCHSNER, M.D.

Howe, C. W., and Warren, S.: Myoblastoma. *Surgery*, 1944, 16: 319.

One of the less well recognized tumors is the myoblastoma, the type cell of which is the primitive precursor of striated muscle. Myoblastoma must be differentiated from other primitive tumors of mesenchymal type, on the one hand, and from rhabdomyoma and rhabdomyosarcoma, on the other hand. The two chief types of readily recognized striated muscle tumors are those occurring in voluntary and those occurring in cardiac muscle. The latter are almost all congenital and benign.

The tumor is usually first noted as a small, yielding, nontender mass, often only 1 cm. or more in diameter. On section it is grayish pink or whitish, and, as a rule, it is fairly clearly demarcated, although it occasionally shows no definite border. Ulceration is rare and, indeed, there may be hyperplastic or neoplastic response of the overlying skin or mucous membrane.

The authors have reviewed the clinical data and microscopic findings of 104 cases collected from the literature and present 10 new cases, 5 of which showed definite malignant properties; 3 of the latter metastasized to the lungs.

Fifty-six per cent of the cases reviewed occurred in the upper respiratory and digestive tracts. Fifty-nine cases occurred in the tongue and of these, 3 (5 per cent) were malignant. Eleven per cent of the total cases were malignant and of these only 3 showed proved metastasis. Age had no clear influence on the occurrence of malignant myoblastic tumors. The patients ranged from eight to eighty-one years of age, although 9 of 13 were over fifty years of age.

Whenever a myoblastoma is reported to have (1) atypism of cells, (2) excess mitotic figures, (3) spindle-cell or sarcomatous pattern, or (4) local invasion, it should be treated surgically as a malignant tumor until more is known of the nature of these growths, especially if the patient is over fifty years of age. The degree of radiosensitivity and frequency of metastasis are as yet unknown. Both appear to be low.

On the basis of available data, 37 patients were treated by surgical excision, 3 by excision and electrocoagulation, 5 by excision and radium therapy, and 1 by electrocoagulation.

JOSEPH K. NARAT, M.D

Morehead, R. P.: Carcinoma in Young Persons. *Arch. Path.*, Chic., 1944, 38: 141.

Neoplasia is a growth disturbance resulting in various types of tumors which appear at characteristic times of life. In infancy and early childhood are found adenosarcoma of the kidney, retinoblastoma, and malignant neurocytoma. Histogenetically, these tumors are embryonic in type and are related to some stimulus from a defect in the cells of the anlage. Late childhood or the presexual period of life has a very low incidence of neoplasia, which is indicative of exhaustion of the carcinogenic factor active in infancy. During puberty the various types of bone sarcoma attain their greatest frequency. This period of life is associated with the critical stages of osteogenesis, which indicates a relationship of bone sarcoma with growth initiation factors and primitive connective-tissue rests.

The author emphasizes the importance of carcinoma in the young and claims that its significance

TABLE I.—DISTRIBUTION OF TYPES OF CANCER ACCORDING TO PERIODS

Infancy and early childhood..	Adenosarcoma of (kidney) Retinoblastoma Malignant neurocytoma of gland (adrenal)
Late childhood or presexual period.....	Fewer tumors appear than at any other period of life
Puberty.....	Sarcoma of bone Tumors of adult life begin to appear and those of childhood to disappear
Young Adult.....	Precocious cases of adult tumors increase in number
Middle Life.....	Malignant lymphoma Carcinoma of cervix Carcinoma of breast
Old age.....	Carcinoma corpus uteri Carcinoma of liver Carcinoma of stomach Carcinoma of rectum

has been lost in the maze of generalizations. Only 15 cases of carcinoma of the cervix occurring at or below the age of twenty years are reported in the literature. The author has added 2 new cases to this number. Carcinoma of the cervix in the young indicates that age influences the morphology of cancer, with the adenocarcinomatous type of malignancy predominating in more than two-thirds of the cases. Carcinoma of the body and fundus of the uterus was found in 3 patients under the age of thirty. Primary carcinoma of the liver is not unusually rare and has been found in 41 infants under two years of age. This suggests that congenital factors may be related to the etiology of cancer in the liver. Other carcinogenic factors may be hereditary or environmental.

In the discussion, BERK said that in an Army hospital, 4 soldiers under the age of thirty-five were found to have carcinoma of the stomach, and 5 under twenty years of age had carcinoma of the large bowel. Clinically, the young are not exempt or immune to neoplastic disease.

RECTOR said that in Michigan there were 546 deaths from cancer in persons under the age of twenty years during a five-year period.

BENJAMIN G. P. SHAFIROFF, M.D.

EXPERIMENTAL SURGERY

Chess, S., Chess, D., and Cole, W. H.: Experimental Tourniquet Shock with Particular Reference to the Toxic Factor: A Method of Production Eliminating the Influence of General Anesthesia and Nervous Impulses. *Arch. Surg.*, 1944, 49: 147.

Tourniquet shock can be produced consistently in animals and therefore it is particularly adaptable for study, but the extreme pain produced by the tourniquet makes it necessary to utilize some type of anesthesia. Prolonged anesthesia is undesirable. Moreover, since nervous impulses are obviously so intensive, this factor might alter the data derived from the experiment. To obviate these disadvantages, the authors have adopted the procedure of cutting the spinal cord at the level of the lowest dorsal or uppermost lumbar vertebra, from two to four days before the experiment is to be performed. Manipulation or operation may be conducted without pain on the lower extremities of the animal with no other anesthetic than a moderate dose of morphine. To keep the tourniquet anchored in one place, a sterile nail is driven deeply into the trochanter. In the experiments in which shock was produced by the release of the tourniquet, death always occurred if the tourniquet was left in place for at least nine hours. In 10 animals studied by this method, death occurred after an average period of two hours and thirty-four minutes following release of the tourniquet. The average loss of plasma into the extremity before and following release of the tourniquet was only 2.1 per cent of the total body weight, which is insufficient, in itself, to explain death.

To determine whether or not a toxin may have developed in the constricted limb, and whether this may have been an important factor in the pathogenesis of shock and death, the authors performed a cross transfusion by injecting blood obtained from the distal portion of the femoral vein of the constricted limb into a normal animal. To prevent increase in shock in the animal subjected to the application of the tourniquet through loss of blood, an equal amount of blood was removed from the recipient dog and injected into the shocked animal.

Four of the 5 animals receiving blood from the constricted limb after release of the tourniquet died in from two to twelve hours after the transfusion was begun. The only dog to survive transfusion of blood which had circulated through the constricted limb was one which did not receive any blood from the constricted limb until ten minutes following the release of the tourniquet. If a toxin was present in the constricted limb it would supposedly be more concentrated in the blood draining from the limb during the first few minutes following release of the tourniquet. If this were true, survival of the animal (which, however, did go into shock during the transfusion but recovered afterward) might be explained.

HOWARD A. MCKNIGHT, M.D.

Duncan, G. W., Irvin, J. L., and Sarnoff, S. J.: Nonprotein Nitrogen and Protein Concentrations of the Serum and Cerebrospinal Fluid in Shock. *Bull. Johns Hopkins Hosp.*, 1944, 75: 135.

Several investigations of problems related to shock have directed attention to possible alterations in the permeability of the membranes, particularly capillary membranes located at the site of the trauma or in more general regions. Although the barrier relationship between the blood and cerebrospinal fluid

differs considerably from that existing between the blood and interstitial fluid, the cerebrospinal fluid is easily accessible and may reflect some of the general relationships and certain changes which occur in shock. The problem was approached by the authors by a comparison of the nonprotein nitrogen and protein concentrations of the serum and cerebrospinal fluid during experimental shock.

The type of shock which appeared to be most suitable for this study was that produced by experimental crushing injury, since it has been shown to be characterized by low blood pressure, progressive hemoconcentration, evidence of renal damage, and death unless treatment is instituted. Fourteen dogs were used as experimental animals. Anesthesia was produced by subcutaneous injections of morphine and nembutal. The mechanical press was applied to a thigh of the animal for a period of fifteen hours at a pressure of approximately 500 pounds. At the end of this time the press was removed, and the animal was observed until the arterial pressure had declined to a level between 50 and 60 mm. of mercury. In most instances, an attempt was made to maintain the animal in shock for the maximum period which still would allow time for the collection of specimens of blood and cerebrospinal fluid before death occurred.

The animals of the control group were given the same amount of anesthetic and were restrained on the table for a period of time equal to the experimental periods for the animals in which shock was produced.

All of the 14 animals subjected to crushing injury demonstrated progressive evidence of shock following the removal of the press at the end of a period of fifteen hours. There was progressive swelling of the injured thigh, progressive fall in the arterial pressure, progressive hemoconcentration, and evidence of renal damage. The time of collection of specimens of cerebrospinal fluid and blood, after the development of severe shock, varied from three to eight hours after removal of the press. The collection of cerebrospinal-fluid specimens from animals in shock was more difficult than the collection from the control group, and at autopsy the ventricles and the spinal subarachnoid space showed gross diminution of fluid in a majority of the cases.

The mean concentrations of both nonprotein nitrogen and protein in the serum and cerebrospinal fluid were found to be significantly greater in the animals in which shock was produced.

From the standpoint of the objective of the authors' investigation, the distribution ratios for nonprotein nitrogen for the two groups suggest that gross alteration of the barrier relationship between the blood plasma and cerebrospinal fluid did not occur under the conditions of these experiments. The small, but significant, increase in the distribution ratio during shock may be explained reasonably as being due to a lag in the normal transfer and distribution of nonprotein nitrogenous substances across the barrier. The increase of the mean concentration of protein in the cerebrospinal fluid of the animals in shock may be explained on the basis of a slight shift of water from the spinal fluid resulting from the hemoconcentration.

The mean ratios of the concentrations of nonprotein nitrogen in the serum to the corresponding values in the spinal fluid were 1.58 for the control group and 2.02 for the group of animals in shock. The mean ratios of the concentrations of protein in the serum to the corresponding concentrations in the cerebrospinal fluid were essentially the same for the two groups.

The experiments indicate that if alteration in the barrier relationship between the plasma and cerebrospinal fluid does occur in shock produced by this method, it is not sufficient to permit extensive passage of the plasma proteins into the spinal fluid.

JOSEPH K. NARAT, M.D.

Bialock, A.: Utilization of Oxygen by the Brain in Traumatic Shock. *Arch. Surg.*, 1944, 49: 167.

Reduction in the effective volume of circulating blood in traumatic shock results in varying degrees of anoxia of the different structures of the body. The nervous system is probably more sensitive than other tissues to a deficit of oxygen, and it is likely that irreversible changes take place there first. Many studies have been performed in recent years on the metabolism and blood flow in the kidneys, the liver, and other organs in shock. The brain has not received sufficient attention in this regard because of difficulties connected with methods for determining the cerebral blood flow and for collecting cerebral venous blood.

The author's studies on dogs consisted of determinations of the oxygen content of arterial blood, of the oxygen content of venous blood obtained from the confluence of cerebral sinuses, and of the total oxygen consumption of the animal after shock was produced by several different methods. The author appreciated at the initiation of these experiments that changes in the arteriovenous oxygen difference may not parallel alterations in the cerebral blood flow. At the same time it was hoped that information on the cerebral utilization of oxygen and the total oxygen consumption of the body would shed some light on the manner in which the brain responds to a reduction in blood volume, cardiac output, and arterial blood pressure.

All of the four experimental conditions for producing shock—hemorrhage, trauma, tourniquets, and burns—were associated with an increase in the arteriovenous difference of both the cerebral-sinus blood and the mixed venous blood. The oxygen utilization of the cerebral-sinus blood and that of the mixed venous blood, in general, paralleled each other closely. The difference in oxygen content of the arterial blood and that of the sinus blood increased in the early stages of shock and this difference usually became more marked as shock developed. The early increase in the arteriovenous sinus-oxygen difference was due in some instances to an increase in the oxygen content of the arterial blood rather than to a

decrease in oxygen content of the venous blood. Alterations in the total oxygen consumption of the body throughout the course of the experiments were not great. If one could assume that the oxygen consumed by the brain also remained essentially constant, the finding of an increased utilization of oxygen would mean that the cerebral blood flow was considerably reduced. Such an assumption is not warranted.

It appears that under conditions of decreasing blood flow the brain, unlike the kidneys, can maintain its oxygen consumption at least partially by extracting increased proportions of oxygen from the arterial blood. JOSEPH K. NARAT, M.D.

Soto, M.: Experimental Observations on Traumatic "Shock" and a Study of the Action of Remedies in this Condition (Observaciones experimentales sobre el "shock" traumático y estudio de acciones medicamentosas en el mismo). *Prensa méd. argent.*, 1944, 31:1423.

The author reports an experimental study of shock and the effect of remedies used for it. Dogs were used as experimental animals, and shock was brought about in two ways—by opening the abdomen and exercising traction on the rectum and gall bladder, and by bringing the intestines outside of the abdomen and wrapping them in compresses wet with physiological salt solution. If the animals were subjected to either of these procedures until the blood pressure fell to half its normal value they never recovered spontaneously. The author used various remedial agents after the shock had reached this stage and presents graphs showing the pulse in different stages of shock and after the remedies were administered.

He gave physiological salt solution and glucose solution in doses of 20 cc. per kilogram of weight; these were repeated 4 times at intervals of an hour. This brought the blood pressure up temporarily but did not save the animals. Salt solution seemed to have a better effect than glucose solution. Hypertonic solution seemed to have a less favorable effect than isotonic solution. Sympathetic stimulants such as ephedrine, adrenaline, veritol, and benzedrine had about the same effect as in normal animals, except that it was less pronounced and shorter in duration. The effect was not visibly improved by giving the stimulant in salt or glucose solution. Atropine, as an inhibitor of the vagus, was used without any markedly beneficial effect. Caffein, as a stimulant of the central nervous system, was given up to convulsive doses without any perceptible effect. Although most authors insist that digitalis preparations are ineffective in shock because the circulatory insufficiency is due to decrease of volume and not to heart failure, it was found that the derivatives of digitalis and strophanthus dissolved in salt solution had appreciable effects and prolonged the life of the animals. The best results were obtained with a hypotonic solution of sodium glycerophosphate to which a digitalis preparation was added. This improved the condition of animals which were in a worse condition than those helped by isotonic solutions and preserved life longer, but none of the remedies saved animals that had reached a certain stage of shock. The digitalis increases the resistance of the heart to fatigue, and the hypotonic solution causes a hemolysis which sets free hemoglobin, phosphatides, and other substances that have a good effect. AUDREY G. MORGAN, M.D.

Ireneus, C., Jr., and Puestow, C. B.: The Effect of Massive Experimental Hemorrhage on the Hepatic Function in Dogs. *Arch. Surg.*, 1944, 49: 100.

Experiments were performed in order to determine whether or not massive hemorrhage could produce enough damage to the liver to give rise to hepatic insufficiency. Twelve dogs were bled from the jugular vein, predetermined amounts of blood being withdrawn every five minutes for thirty minutes, so that the amount of blood removed was 30 cc. per kilogram. This amount of blood loss constitutes a sublethal hemorrhage. The hepatic function tests employed were the sulfobromophthalein sodium (bromsulfalein) test, the galactose tolerance test, the prothrombin time test, and the serum phosphatase test.

The galactose tolerance test consistently showed results indicative of hepatic damage, the excretion of galactose being above normal in 8 of 11 animals. The prothrombin time was definitely prolonged in 4 of the 11 animals. The other tests gave results within the limits of normal.

The authors point out that if one or two tests of hepatic function give positive results, a certain amount of hepatic insufficiency exists, since the tests are so insensitive that a positive result must be considered significant. The wide margin of safety possessed by the liver, only from 30 to 40 per cent being necessary to maintain life, is possibly the explanation for the mild impairment of hepatic function found in these experiments.

It is concluded that definite although slight impairment of hepatic function was produced by massive acute hemorrhage in these experiments.

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